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CHAPTER 1

INTRODUCTION

1.1 Introduction

For a developing country like Malaysia, business has been an important aspect to generate the country's economy. As we are moving fast to the electronic and computerized end, electronic commerce has become one of the impacts from the rapidly changing and developing technology.

Therefore, in order to keep with the rapidly changing business trends, Human Resources Management System is developed to all employees who prefer auctions online through this system. The Human Resources Management System takes this opportunity to develop a web-based system which provide different approach for data management and provide complete support for all human resources needs with functionality to manage and maintain data in effective way.

The Human Resources Management System is a web- based application that will contain a database server. It uses the Internet and its browser to present data and retrieve inputs. The development of this site is to foster closer ties between the administrator and employee and to facilitate networking among them.

Thus, this system will provide an easy and convenient method for the employee to look up for information and also to keep them updated on the latest happenings in their company.

1.2 Project Objectives

The objectives of this project are as below:

- 1) To establish an easy way for employees to know their current data or current status using this system.
- 2) To decrease the communication gap between management level and employees with the on-line facility.
- 3) To develop an application, which is able to generate reports from the stored information for easy review for the management level and employees.
- 4) To develop a reliable and efficient database to increase quality and accuracy in data keeping.

1.3 Targeted User

This system is develop for all company which have Human Resources department and responsible to store and keep all information about employees.

1.4 Project Scopes

The project consists of two modules. These two modules are:

1.4.1) Administrator Module

This module is developing only for administration purpose. Administrator with correct username and password are allowed to access into this module. Administrator can add, delete, edit or make any changes to data.

1.4.2) User Module

User module gives permission to all employees to access to the system. Users must create their own account before the system will let users to access into it. Only users with correct account can view information and user not allowed to add, delete or edit that information.

Besides these two modules, there are three subsystems in each module. These three subsystems are:

- 1) Administer Workforces Subsystem (AW)
- 2) Position Management Subsystem (PM)
- 3) Global Absence Subsystem (GA)

1) Administer Workforces Subsystem (AW)

Administer Workforces subsystem is the main subsystem in Human Resources Management System. It consist data and all information about employee personal data include their staff number, name, address and so on. Only administrator has authority to access into this subsystem to maintain all data from time to time to make sure the integrity of data. Users also can access into this subsystem, but only to view data without permission to make any changes.

2) Position Management Subsystem (PM)

This subsystem consists current information about employee status in that company. Employee status includes information about department, postposition, rank and others. This is the same subsystem as Administer Workforces which is only administrator can access into this subsystem and users only can view data without make any changes.

3) Global Absence Subsystem (GA)

Global Absence subsystem is the subsystem where is employee can access into it and check their leave via network such as their absence balance, compulsory leave schedule, leave status and employee also can apply leave via this subsystem. Users can edit, delete or cancel leave using this subsystem.

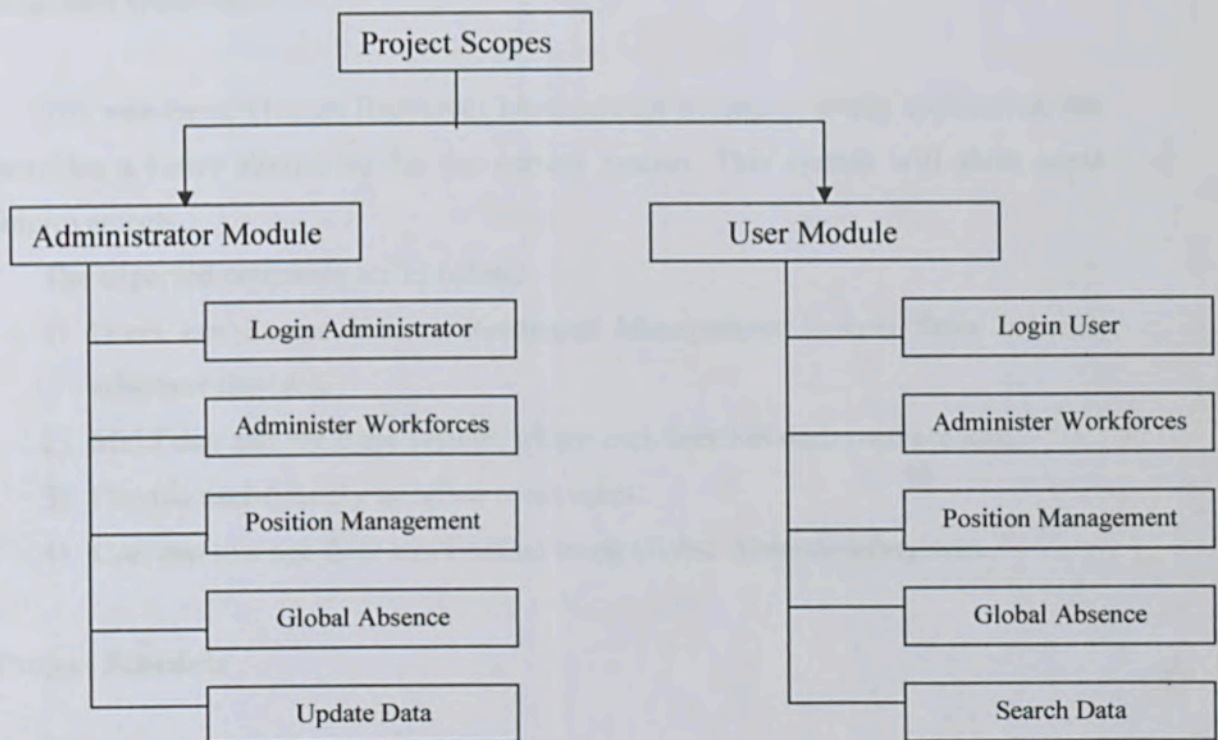


Figure 1. 1: Project Scope

1.4.3) Registration and Login System

Since this project is a web- based application, and it will be published using web-hosting services, therefore a project should be designed to promote the site and linked to the registration page to allow users to create an account in the system. A user must register with the system to create an account before he or she is able to access the services provided by the system. Every user should have a unique login name and the user account is password protected. Once registered, user needs only to enter his or her login name and password before accessing account. Only registered users are allowed to sign in to the system.

1.5 Expected Outcome

The web-based Human Resources Management System is a web application that provides a better alternative for the current system. This system will show some improvements.

The expected outcomes are as below:

- 1) Users can access Human Resources Management System from Internet, wherever they are.
- 2) Multi user can login the system, where each user has their own account.
- 3) Provide user-friendly interface to all users.
- 4) User can manage their leave online using Global Absence subsystem.

1.6 Project Schedule

Project management is the process of scoping, staffing, organizing, directing and controlling the development of an acceptable system at a minimum cost within a specified time frame. Project mismanagement often brings to the project failure. Therefore, a good plan should be prepared to ensure the successfulness of the project.

Project schedule involves separating the total work in a project into separate activities and judging the time required to complete it. A project guideline was planned to manage the time and accomplish the implementation of the web-based Human Resources Management System.

Below are some general tasks:

- 1) Project introduction
To define the problem statement, objectives and scopes of the project.
- 2) Literature review
To study and analysis the existing system.
- 3) Requirement analysis
To define and priorities requirement such as functional and non-functional requirement.

4) System and program design

To transform the project requirements into design specification for construction.

5) System coding

To write codes for the designed system.

6) System testing

To test designed system components.

7) Integration testing

To test the whole system and deliver the system into operation.

8) Report documentation

To record all the information for review to present the system runs out from the scope, objectives and requirements.

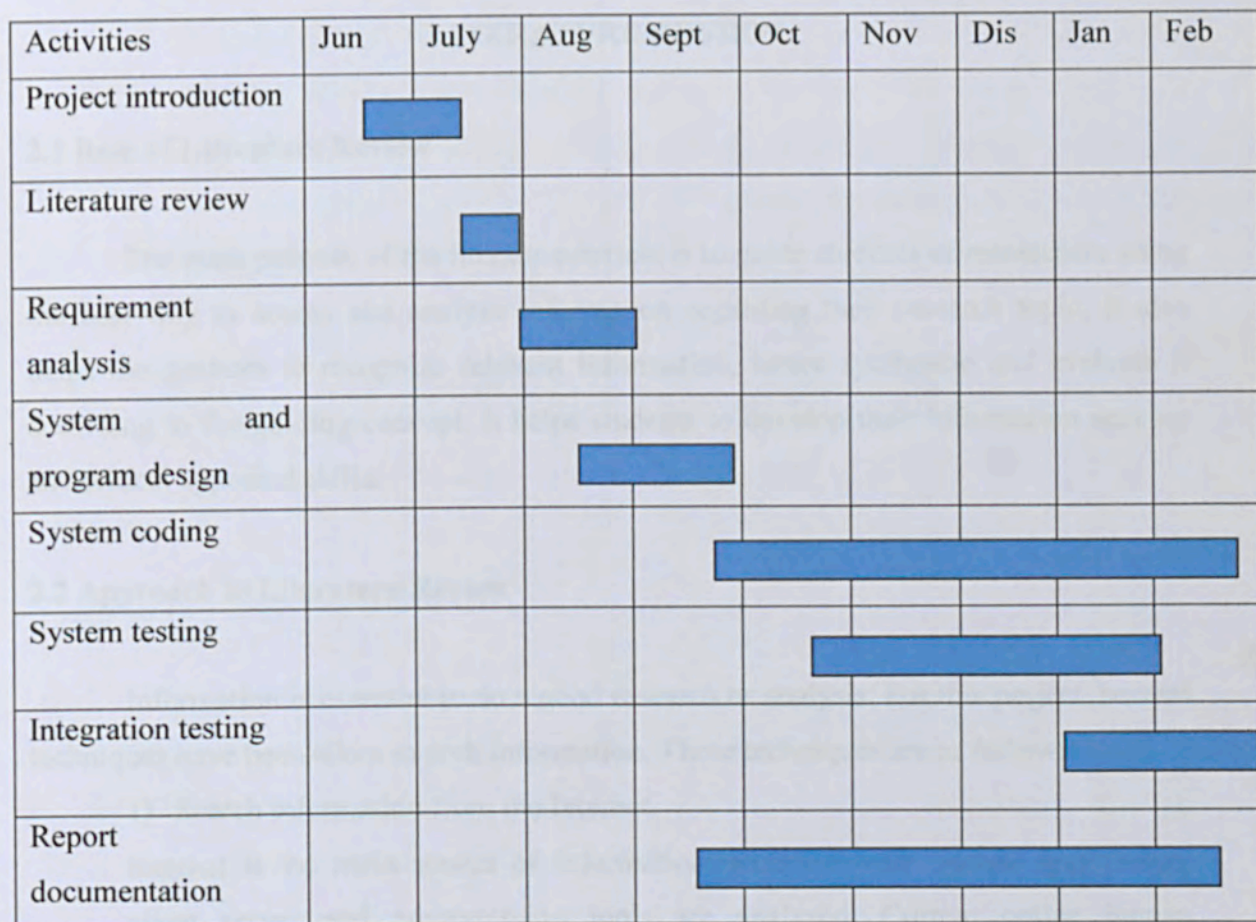


Figure 2: Gantt Chart

CHAPTER 2

LITERATURE REVIEW

2.1 Role of Literature Review

The main purpose of the literature review is to guide students or researchers using the best way to access and analyze information regarding their research topic. It also helps the students to recognize relevant information, hence synthesize and evaluate it according to the guiding concept. It helps students to develop their information seeking and critical appraisal skills.

2.2 Approach to Literature Review

Information is essential to do a good research or analysis. For this project, several techniques have been taken to seek information. These techniques are as follow:

- 1) Search information from the Internet.

Internet is the main source of information. Relevant info on web application, client server and programming tools are analyzed. Current online human resources management systems are also viewed and compared. Many ideas can be gained by browsing current systems that are available in the Internet.

- 2) Do analysis on the past final year project.

Several past final year project have been studied in order to gain some skills or software development and as guidance in system design and requirements.

- 3) Refer to newspapers and magazines.

Reference on the latest newspaper such as New Strait Times, magazines and some human resources catalog is one of the techniques to get information for the project.

4) Have discussions with friends and lecturer

The lecturer during every meeting has given useful advice and ideas. It is important to use those advice and ideas as a guideline when carrying out the system development process. Suggestions given by friends are also useful throughout the development of project.

2.3 Findings

2.3.1 Current Online Human Resources Management System

- People-trak.com

People-trak is an independently owned company whose mission in life is to bring users the best HRMS classified web site in California. This web site offers a wide array of workforce management tools. From recruiting, through compensation, performance and benefits administration, People-trak provides automation tools for the entire employee life cycle. It's easy to use, easy to learn, and fairly priced. People-trak also provides training administration to their new and existing customer every month. This training is to train employees how to use the software.

People-Trak ESS/MSS is a browser-based product that makes any employee or any manager can edit or view the information stored in People-Trak. People-Trak ESS/MSS replaces the multitude of paper and replaces them with a direct entry, electronic equivalent. Besides, an email containing People- trak product and answers to your question will also be sent to the user.

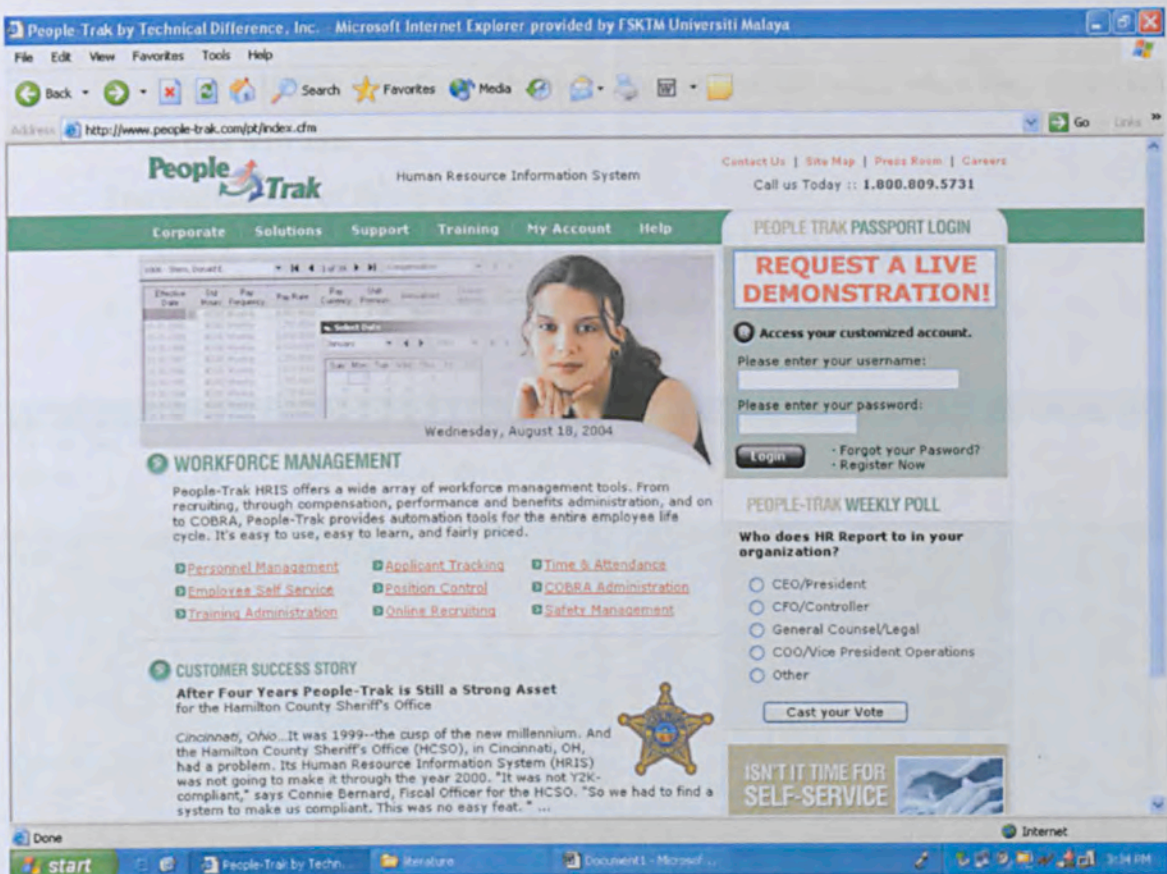
The strengths about this site are:

- Customer can search for a service by selecting a category, conducting a keyword search.
- It provides a pop-up window when the user clicks for information regarding the department. This help to eliminate the need for user to

click the back button when finished browsing the department's information, the user just needs to close the department's information window when completed.

The weaknesses of this site are:

- Although many category of service provide in this web site, but when services is selected, most of them cannot display the service.
- Too many words in the web page



- Abrasoftwaresolutions.com

This web site provide the most comprehensive, integrated, easy to use and easy to implement solutions for the management of today's small to mid-sized organization's personnel. All information about management of Human Resources,

Payroll, Attendance, Recruiting, Employee Training, Attendance Tracking, and Employee Self-Service is provided.

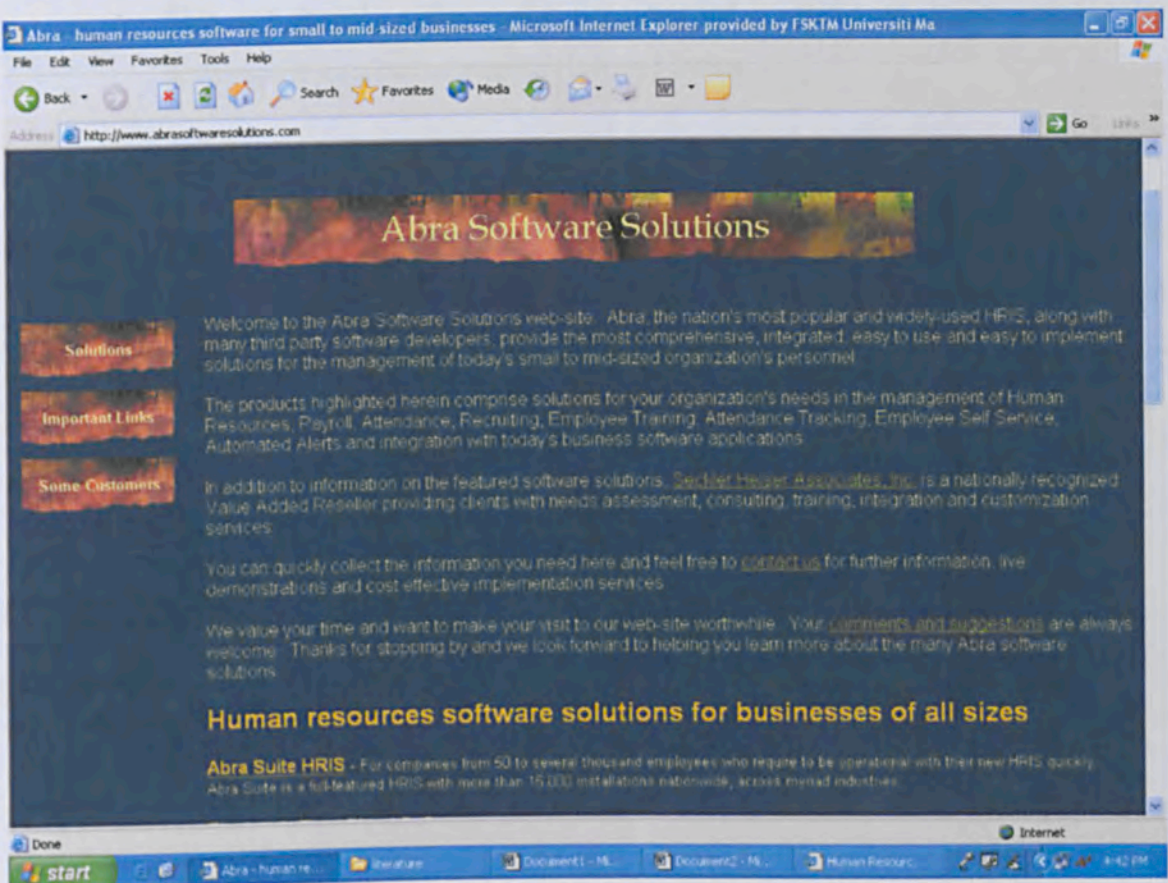
One of the strength of this system is that the information provided is very details. Others than the staff information, the Cyber Recruiter module is also provided that will help human resources staff to manage resumes, applicants and open positions from the creation of the open position through the searching, routing and hiring of applicants. Besides, several related link such as Training Schedule is also provided.

The strengths about this are:

- It has a simple interface. This will not confuse the users when they first visit to this web site.

The weaknesses of this site are:

- Search engine for the product is not provided in web page.
- The layout of the web site is not systematic.



- Xpdoffice.com

Xpdhr is a web-based human resources software tool. Xpdhr encompasses all of your personnel management functions. It provides centralize and easily access employee records which is all data is stored in one secure place. Authorized personnel also can use xpdhr's human resources software to view comprehensive and up-to-the-minute reports. This is an easy way for managers and HR professionals to handle personnel tasks, and gather and access employee.

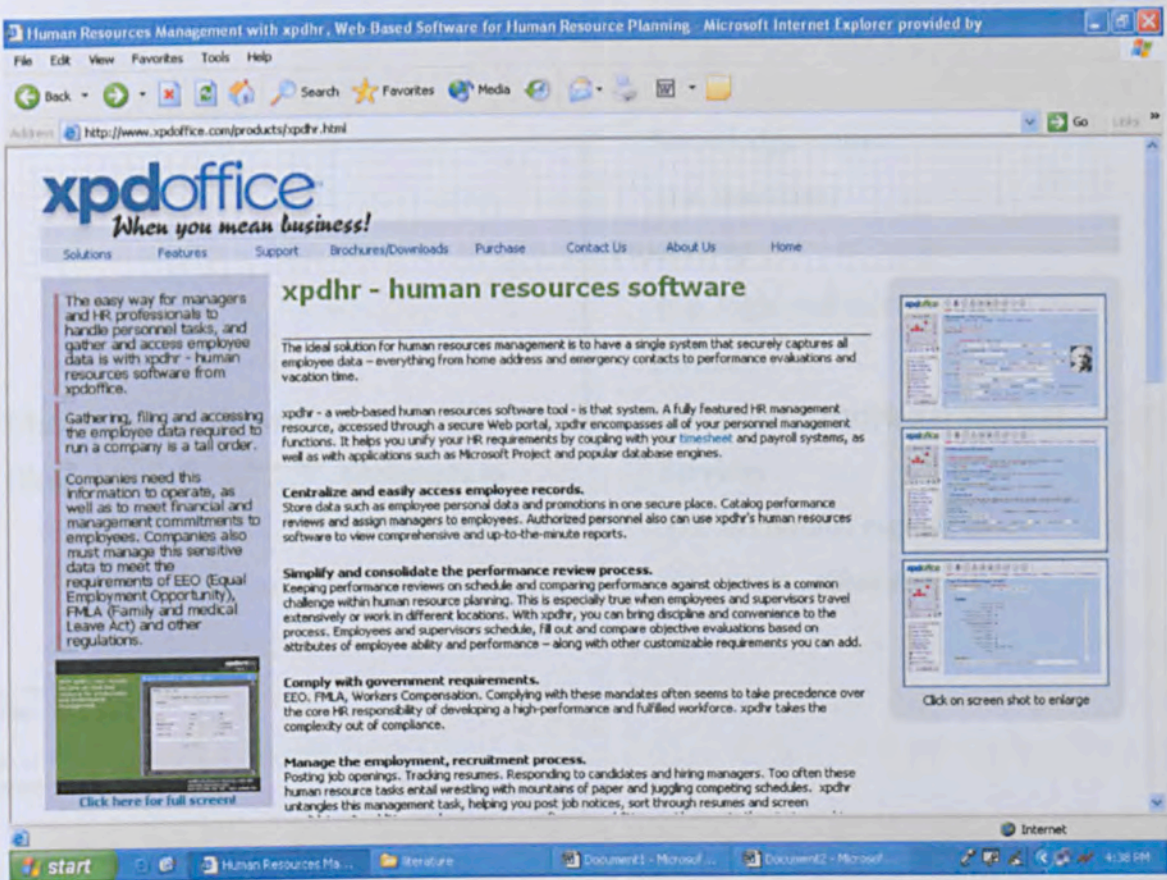
There is also a search facility where employees can do a staff searching through a form containing information such as hire date, birth date and so on. Staff that matches information submitted will be listed and available for further information. A payment calculator function was provided to be a guide and it helping employees calculating monthly payments according to their salary.

The strength of this site is:

- This site greatly reduces the time needed to make an online service by limiting the number of registration and forms.

The weaknesses of this site are:

- Users can be confused when they want to log in to the system because the site does not provide the log in panel when the new users first visit to the sites.



2.3.2 Client Server Computing

In its most fundamental form, client / server involves a software entity (client) making a specific request, which is fulfilled, by another software entity (server). Figure 2.1 illustrates a client / server exchange. The client process sends a request to the server. The server interprets the message and then attempts to fulfill the request. In order to fulfill the request, the server may have to refer to a knowledge source (database), process data (perform calculations), control a peripheral, or make an additional request of another server. In many type of architecture, the client can make request to multiple servers and a server can service multiple clients.

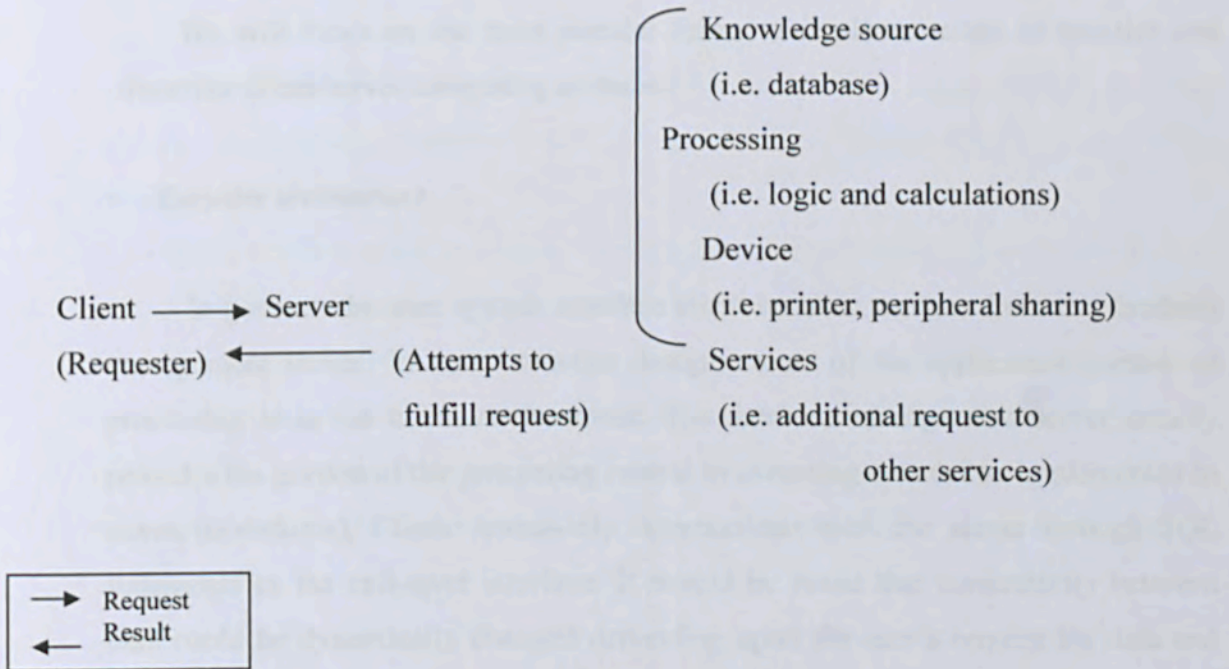


Figure 2.1: Client/Server Transactions

It is important to understand that the relationship between client and server is a command/control relationship. In any given exchange, the client initiates the request and the server responds accordingly. A server cannot initiate dialog with clients. Since the client and server are software entities, they can be located on any appropriate hardware, and request data from the server process running on another server hardware or even can be located on a personal computer. In another scenario, the client and server processes can be located on the same physical box.

- Architecture Types

We will focus on the most popular forms of implementation of two-tier and three-tier client/server computing systems.

- Two-tier architecture

In general, the user system interface client invokes services from the database management server. In many two-tier designs, most of the application portion of processing is in the client environment. The database management server usually provides the portion of the processing related to accessing data (often implemented in stored procedures). Clients commonly communicate with the server through SQL statements or the cell-level interface. It should be noted that connectivity between tiers could be dynamically changed depending upon the user's request for data and services.

Two tiers

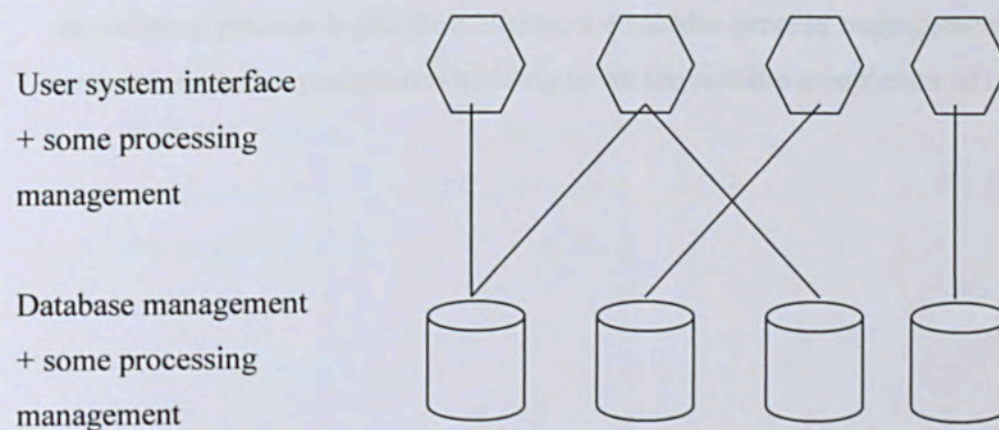


Figure 2.2: Two-Tier Client Server Architecture

- Three Tier Architecture

A three tier distributed client/server architecture includes a user system interfaces top tier where user services (such as session, text input, dialog and display management) reside.

The three tiers provides database management functionality and is dedicated to data and file services that can be optimized without using any proprietary database management system languages. The data management component ensures that data is consistent throughout the distributed environment through the use of features such as data locking, consistency and replication. It should be ruled that connectivity between tiers could be dynamically changed depending upon the user's request for data and services.

The middle tier provides process management services (such as process development, process enactment, and process monitoring) that are shared by multiple applications. The middle tier server (also referred to as the application server) improves performances, flexibility, maintainability, reusability and scalability by centralizing process logic. In addition, the middle process management tier controls transactions and asynchronous queuing to ensure reliable completion of transactions.

▪ Three tiers

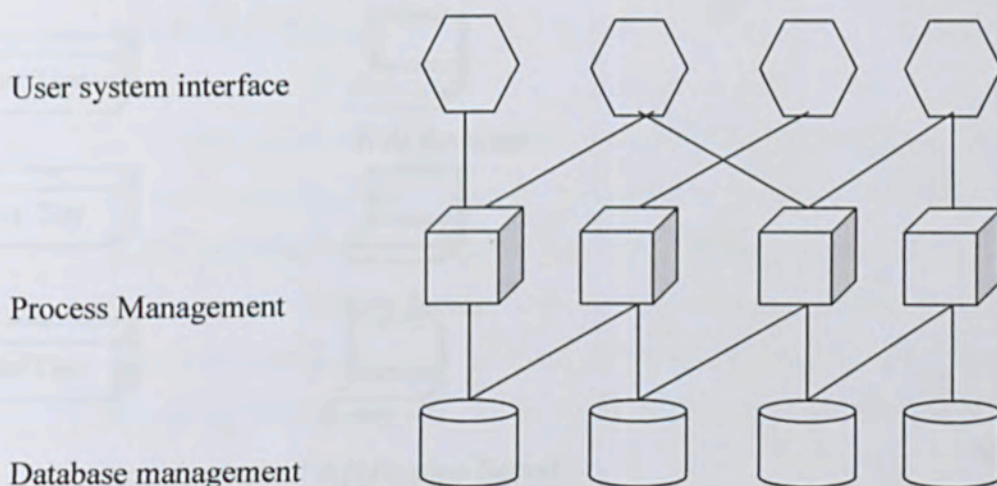


Figure 2.3: Three-Tier Distributed Client Server Architecture

2.3.3 Web Application Architecture

Web architecture can also evolve from the client server application but needs extensive planning and is no simple task. Web application use Internet protocols such as TCP/IP, Hypertext Transfer Protocol (HTTP) and Hypertext Markup Language (HTML) for implementation display and networking protocol to achieve architecture that are robust, scalable and that can accommodate rapidly changing technology.

2.3.4 Web based Application

A typical web-based application, by its browser/server nature, follows the two-or n-tier model. Applications designed for the World Wide Web place the least number of the applications on the client, and keep all the processing centralized on one or more servers. The following figure 2.4 shows web-based applications.

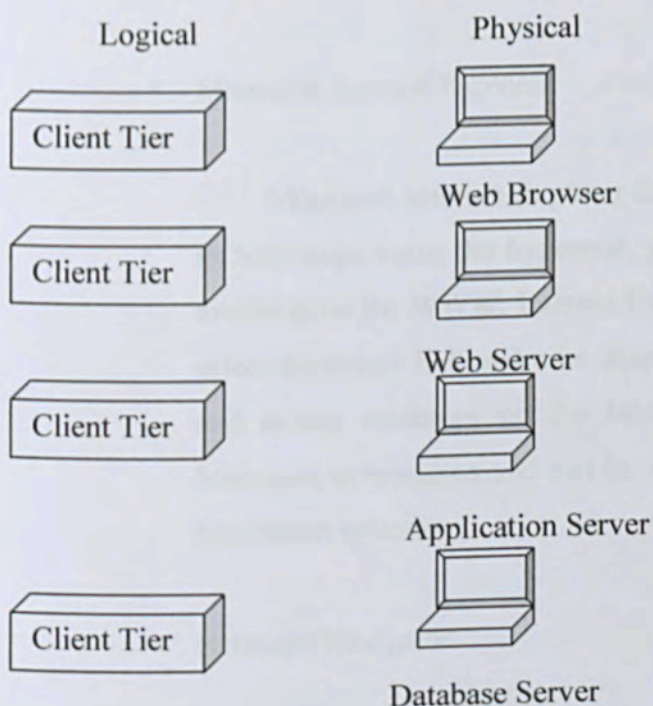


Figure 2.4: Web-Based Application

2.3.5 Web Browser

The web browser is the client program that users run on their local machine to gain access to a web server. It is a user-interface or document-presentation tool. It only knows how to take the information from the server and present it to the user. It is also able to capture data entry made into a form and get the info back to the server for processing. Web browsers are multimedia enabled. They can process text, graphics, audio and videos, which are marked up or embedded in HTML documents. One of the powerful features of HTML documents is the function of hyperlinks.

Currently, the most popular browsers are Netscape Navigator/Communicator and Microsoft Internet Explorer. The features of browser software have expanded to encompass the ability to access other Internet services in addition to the World Wide Web.

- Microsoft Internet Explorer

Microsoft Internet Explorer is a graphical web browser which enables a user to fully experience the hypertext, photographs, sound, video, and etc. Those are available on the WWW. Internet Explorer utilizes “point-and-click” technology to select hypertext link and uses drop-down menus and toolbar buttons to navigate and access resources on the Internet. Internet Explorer was developed by a Microsoft corporation and can be used on PCs running Window 3.1 or better on Macintosh systems.

- Netscape Navigator

Netscape Navigator is one of a best web browser available. It provides the user with brilliant graphics, sophisticated page layouts and high speed downloads. The Netscape Navigator gives a user the ability to read and send e-mail, transfer files (FTP), or read and post usenet news. It also can be configured to access new media types, such as video or run other applications within the browser through Helper Applications or plugins.

2.3.6 Programming Tools

2.3.6.1 Client-Side Programming language

2.3.6.1.1 Java Script

Scripting languages develop by Netscape to enable web authors to design interactive sites. Although it shares many of the features and structures of the full Java language, it was developed independently. Java script can interact with HTML source code, enabling web authors to spice up their sites with dynamic content. Java script is endorsed by a number of software companies and is an open language that anyone can use without

purchasing a license. Js code can be imbedded in HTML pages and interpreted by the web browser (or client). Js can also be run at the server, as in Microsoft's Active Server Pages, before the page is sent to the requestor. Both Microsoft and Netscape browsers support Js, but sometimes in slightly different ways. It is supported by recent browsers from Netscape and Microsoft, though Internet Explorer supports only a subset, which Microsoft calls Jscripts.

2.3.6.1.2 VB Script

VB script is a lightweight version of Visual Basic designed specifically for scripting applications that can be downloaded and run as part of the HTML code that comprises web pages. VB script is an interactive to Java Script and PERL, and will run across multiple platforms, including windows, Macintosh and Unix. VB script will be supported in Microsoft's own browser implementations, including Internet Explorer and the Internet Add-on for Windows 95.

2.3.6.1.3 HTML

HTML (Hypertext Markup Language) is the set of markup symbols or codes inserted a file intended for display on World Wide Web browser page. The markup tells the web browser how to display a web page's words and images for the user. Each individual markup code is referred to as an element (but also refer to it as a tag). Some elements come in pairs indicates when some display effect is to begins and when it is to end.

HTML is a formal Recommendation by the World Wide Web Consortium (W3C) and is generally adhered to by the major browsers, Microsoft's Internet Explorer and Netscape's Navigator, which also provides some additional non-standard codes. However, both Internet Explorer and

Netscape implement some features differently and provide non-standard extensions. Web developers using more advanced features of HTML and may have to design pages for both browsers and send out the appropriate version to a user. Significant features in HTML 4 are sometimes described in general as dynamic HTML. What is sometimes referred to as HTML 5 is an extensible form of HTML called Extensible Hypertext Markup Language (XHTML).

2.3.6.2 Server-Side Programming Language

2.3.6.2.1 Active Server Pages

Microsoft ® Active Server Pages (ASP) is a server-side scripting environment that you can use to create interactive web pages and build powerful web applications. When the server receives a request for an ASP file, it processes server-side scripts contained in the file to build the web page that is sent to the browser. In addition to server-side scripts, ASP files can contain HTML (including related client-side scripts) as well as calls to COM components that perform a variety of task, such as connecting to a database or processing business logic.

Some related facts:

- ASP is free for Window NT or Windows 95/98- Internet Information Server 3.0 had the first ASP with all its essential features. IIS 4 (also called NT OPTION pack 4) contains the latest ASP and all its goodies.
- ASP scripts can be tented offline with Personal Web Server (PWS) on Windows 95/98.
- ASP code is mixed within HTML on a page –it does not need to be compiled separately or deployed. HTML programmers can just add ASP commands to their page freely.
- ASP scripts are pure ASCII and can be edited with Notepad or more sophisticated tools like Visual InterDev.

- ASP code is not biased towards any browser- it runs on the server can serve up pure HTML to any browser even one that supports no scripting.
- ASP can allow browser users to manipulate database (view, edit, manage) from any browser by serving up HTML with ADO (Active Data Objects) and allowing HTML web pages to generate database updates which the server takes care of. Server database can be from any vendor as long as an OLEDB or ODBC driver is available.
- ASP supports server components built with other languages. People familiar with Java, C++, Visual Basic and Delphi can assemble their compiled code easily into a component that HTML programmers can call within their ASP page.
- ASP supports VB script syntax or Jscript syntax upon initial installation. VB script is the most popular way most users code because it is simpler than Jscript.

2.3.7 Server Type

There are many types of different servers used in the market place today. They can be categorized and below are some of the category.

2.3.7.1 Web Server

Web servers allow user to serve content over the Internet using the HTML. The web server accepts request from browsers like Netscape and Internet Explorer and then returns the appropriate HTML documents. A number of server-side technologies can be used to increase the power of the server beyond its ability to deliver standard HTML pages, these include CGI script, server-side includes, SSL security, and Active Server Pages (ASPs).

- Internet Information Server (IIS)

Microsoft Internet Information Server (IIS) is built into a Microsoft NT server operating system. It was designed to deliver a wide range of Intranets and the

Internet server capabilities for corporate. IIS can be used alone as a web server, or in conjunction with compatible technologies to set up Internet commerce, to access and manipulate data from a variety of data sources and to build web applications, that take advantage of server script and component code to deliver client-server functionality.

2.3.7.2 Application Server

Application servers, whatever their function, occupy a large chunk of computing territory between database servers and the end user. Most broadly, this “country” is called “middleware” and that tells you something about what application server do. First and foremost, application servers connect database information (usually coming from the database server) and the end-user or client program (often running in a web browser). There are many reasons for having an intermediate players in this connection—among other things, a device to decrease the size and complexity of client programs, the need to cache and control the data flow for better performance and the requirement to provide security for both data and user traffic.

Application servers have different roles, and not every company requires the same functionality. Scalability is a good example. Some companies might want an application server that simply helps them organize their application for the web, gives them better control over the business logic they contain, and make it easier to monitor and secure the data. Other companies, especially big ones, do need to manage thousands of servers. For them, the scalability of an application server is crucial.

2.3.7.3 Proxy Server

Schematically, a proxy server sits between a client program (typically a web browser) and some external server (typically another server on the web). The proxy server can monitor and intercept any and all request being sent to the

external server or that comes in from the Internet connection. This positioning gives the proxy server three capabilities: filtering requests, improving performance and sharing connections.

Filtering requests is the security function and the original reason for having the proxy server. Proxy servers can inspect all traffic (in and out) over an Internet connection and determine if there is anything that should be denied transmission, reception or access. Since this filtering cuts both ways, a proxy server can be used to keep users out of particular web sites (by monitoring for specific URLs) or restrict unauthorized access to the internal network by authenticating users. A proxy server can also examine the content of transmissions for “inappropriate” words or scan for viruses, although this may impose serious overhead on performance.

The other aspect of proxy servers, improving performance, is for less controversial. This capability is usually called proxy server caching. In simplest terms, the proxy server analyzes user requests and determines which, if any should have the content stored temporarily for immediate access. If a page were requested repeatedly, the proxy server would cache it for immediate delivery to the web browser. Cache management is a big part of many proxy servers, and it is important to consider how easily the cache can be tuned. Some proxy servers, particularly those targeted at small business, provide a means for sharing a single Internet connection among a number of workstations. While this has practical limits in performance, it still can be very effective and inexpensive way to provide Internet services, such as e-mail, throughout an office.

2.3.7.4 Mail Server

E-mail is generally considered the most important service provided by the Internet, which makes server store mail. For Internet mail servers, a very important factor is the support of standard. The major protocols are SMTP (Simple Mail Transfer Protocol) for outgoing mail and POP3 (Post Office Protocol) for incoming mail. The highly publicized viruses that attach through e-

mail clients have put the spotlight on e-mail as a vulnerable point in an enterprise's firewall. In response, mail server vendors (along with major client vendors such as Microsoft) have begun producing add-ons and built-in features that will help to scan mail, segregate questionable messages, and deal with viruses and spam.

2.3.7.5 Database Server

The database server plays a vital rule in Internet application development. The database server can be used to store, search and retrieve information that were stored in a database.

2.3.7.6 Certificate Server

The certificate server was developed to help ensure data integrity for a web sites or applications. Data integrity is composed of two parts. In the first part, client and server authentication, it helps to ease the proof for client and server authentication and then issuing digital certificates for legal vendor. The second part, maintaining data integrity over the Internet is for ensures data protection while information is being transferred from web server to client browser.

2.3.7.7 Firewall

A firewall is a set of related programs, located at a network gateway server that protects resources of a private network from users from other networks. An enterprise with an intranet that allows its workers access to the wider Internet installs a firewall to prevent outsiders from accessing its own private data resources and for controlling what outside resources its own users have access to. A firewall is often installed in a specially designated computer separate from the rest of the network. So that no incoming request can get directly at private network resources.

2.3.8 Database

Database is a shared collection of logically related data, designed to meet the information needs of an organization.

2.3.8.1 Microsoft SQL Server 2000

SQL Server 2000 provides agility to data management and analysis. From the data management and analysis perspective, it is critical to turn raw data into business intelligence and take full advantage of the opportunities presented by the web. A complete database and data analysis package, SQL Server 2000 lead to the rapid development of a new generation of enterprise-class business applications. It is a fully web enabled database product, providing core support for Extensible Markup Language (XML) and the ability to query across the Internet and beyond the firewall.

2.3.9 Others

2.3.9.1 Microsoft Windows 2000 Professional

Windows 2000 Professional is the Windows operating system for business desktop and laptop systems. It is used to run software applications, connect to Internet and Intranet sites, and access files, printers and network resources.

Built on Windows NT technology and the easy-to-use, Windows 2000 Professional give business users increased flexibility. The integration web capabilities let you connect to the Internet from anywhere, at anytime, and cost effective communications option. In addition, broad peripheral and mobility computer support make Windows 2000 Professional and ideal operating system for the workforces that increasingly rely on notebook computers.

2.3.9.2 SQL

Over the last few years, Structured Query Language or SQL has become the standard relational database language. The American National Standards Institute (ANSI) defined a standard for SQL. More than 100 database management systems now support SQL, running on various network platforms from personal computers to mainframes.

Objectives of SQL:

- Create the database and relation structures.
- Perform basic data management tasks, such as the insertion, modification and deletion of data from the relation.
- Perform both simple and complex queries to transform the raw data into information.

SQL is an example of a transform-oriented language, or a language designed to use relations to transform inputs into required outputs. As a language, SQL has two major components : A data Definition Language (DDL) for defining the database structure and a Data Manipulation Language (DML) for retrieving and updating data.

Below are available SQL DML statements:

- | | |
|----------|-------------------------------|
| ▪ SELECT | To query data in the database |
| ▪ INSERT | To insert data into a table |
| ▪ UPDATE | To update data in a table |
| ▪ DELETE | To delete data from a table |

2.4 Summary Of Literature

From the research through Internet, it is not difficult to come across an online human resources management system. These kinds of system are not so common in Malaysia. Most of the web sites about human resources management system are for oversea countries.

From the analysis of current web sites, one feature that can be found is that most of the web sites provide services such as personal management, employee self-service and many others. However, some advanced systems provide loan calculation for their employees to enhance the functionality of the system.

As a summary, an online human resources management system should provide some basic services to their employees. However, some extra services can be added in order to gain competitive edge over other related web sites. Besides, a deeper understanding about those technologies is gained after the analysis had been done for the collected information.

2.5 Relationship to Proposed Project

By exploring a lot of different online human resources management system web sites that are currently available, information and knowledge can be gained. All advantages and goal points of these web sites will be incorporated into the development of the proposed system after some consideration about the feasibility. At the same time, the disadvantage that was found from these current web sites will be avoided as much as possible.

After collecting the information about web-based application, web browser, programming tools, server types and database management system, comparison among all those available choice can be done. As a result, a better selection can be made in choosing programming tools, servers or other related aspects to be used in the proposed system.

CHAPTER 3

METHODOLOGY

3.1 Project Objective

Human resources management system is a system that provides an easy way to manage the company with providing the effectiveness system to store all data about employee's rather than doing so through the traditional way. It will see a transformation from the manual filing and searching, to the electronic system, made available in the Internet. This system will eliminate the problems of time, limited information, and travelling cost faced by the traditional method since users need only to register as a member.

The system will be able to let the members act as the administrator to manage their leave by providing full access to update their application leave. Members of the system can edit their leave information anytime. Members also can use the email function provided by the system to gain contact with the administrator.

The system will contain database that will contain tables about information of the company and their services and also the table for user particulars, which is the membership system. The system also provides user-friendly interfaces by using Graphical User Interface (GUI) approach so that it is easier for the users to use and understand the system.

Besides that, the system will have the search engine to reduce the user's time to search for the items in the system and other services.

3.2 Development Methodology

The waterfall model with prototyping has been chosen as the system process model. Figure 3.1 below shows the waterfall model with prototyping.

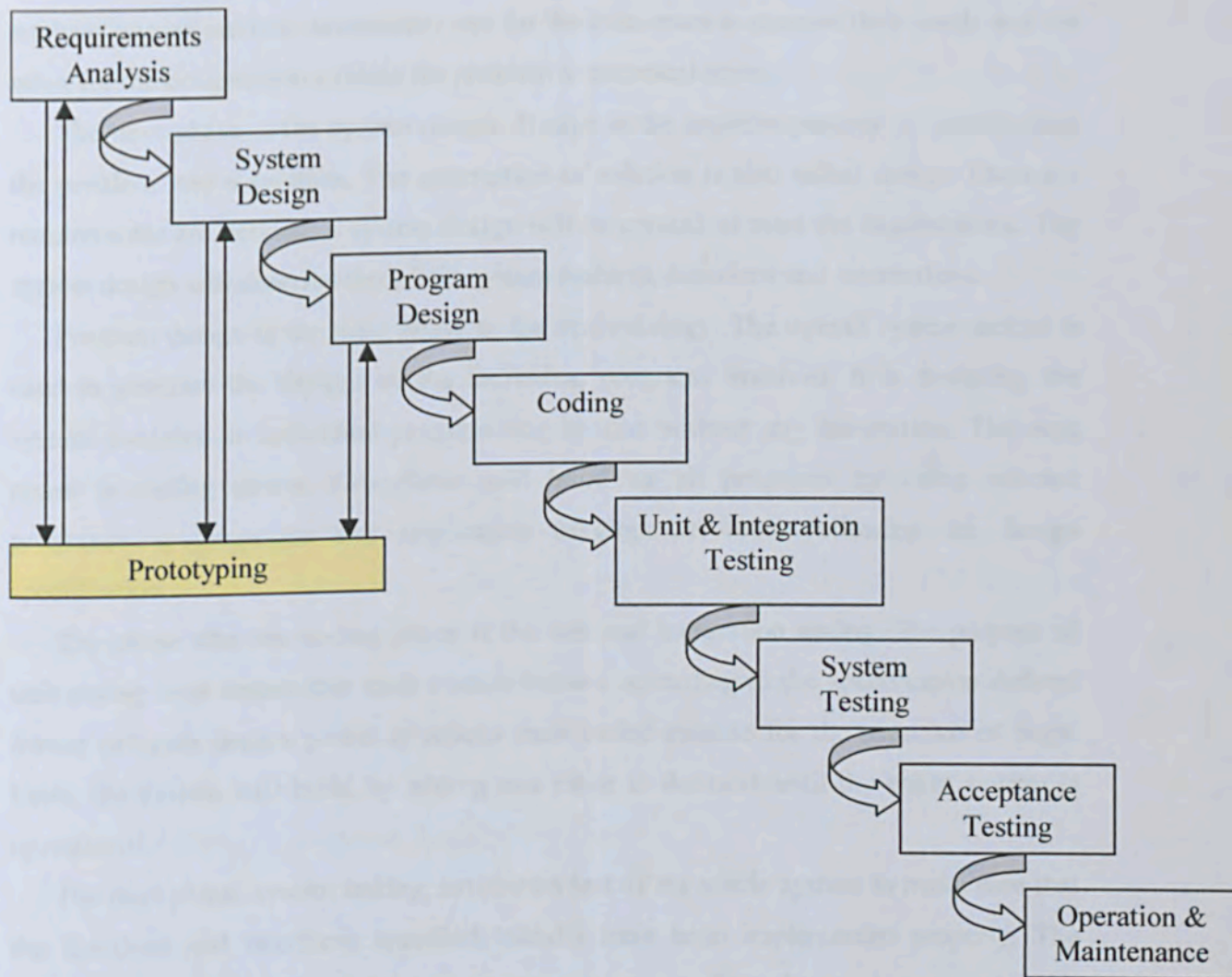


Figure 3.1: Waterfall Model with Prototyping

This system process model contains eight phases, which are the requirement analysis, system design, program design, coding, unit and integration testing, system testing, acceptance testing and operation and maintenance.

The first phase in this methodology is requirement analysis, which requires information gathering. A requirement is a feature of the system or the description of something the system is capable of doing in order to fulfill the system's propose. This is the phase where researchers and surveys are done. The results of the requirements

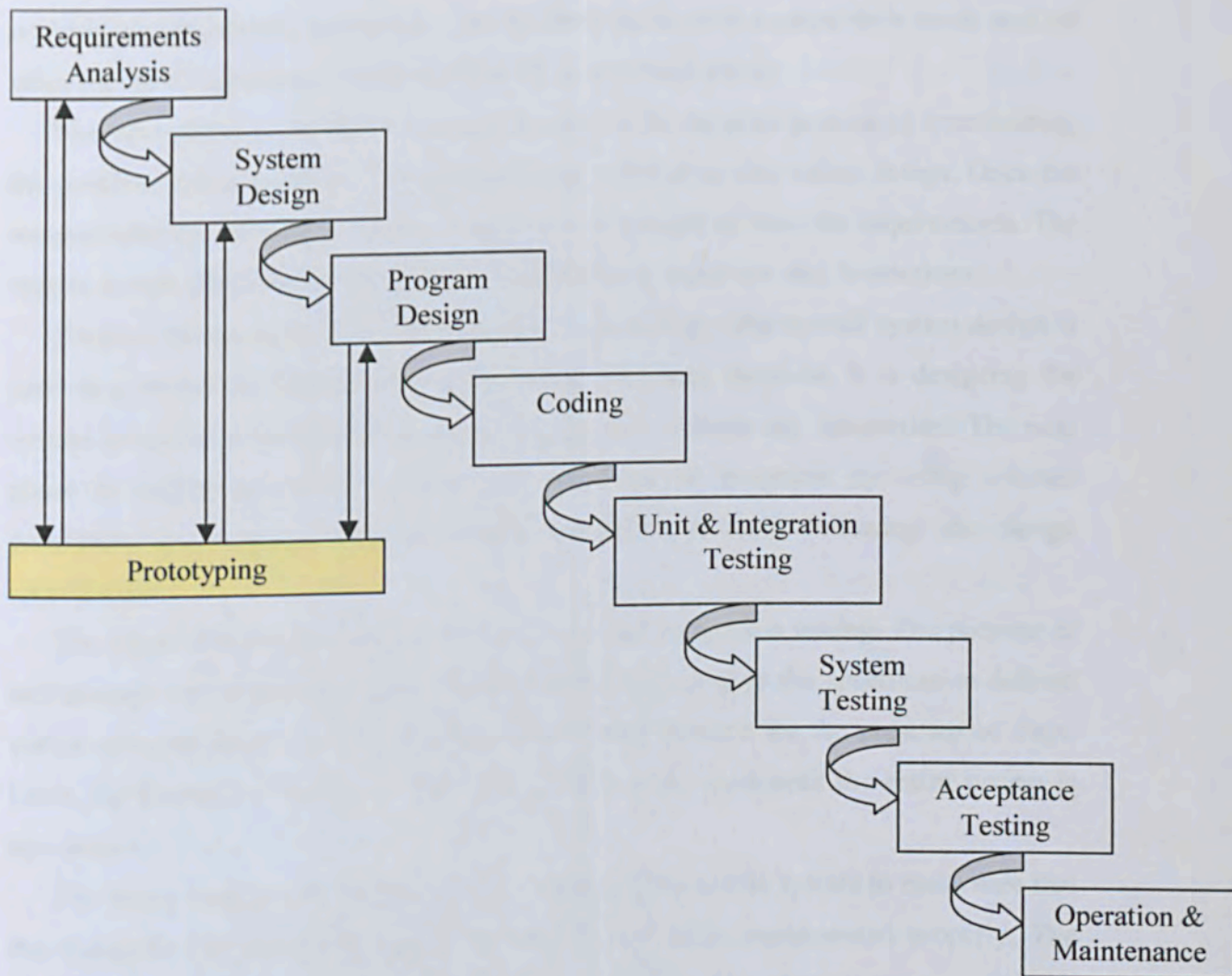


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analysis phases are two documents: one for the customers to capture their needs and the other for the designers to explain the problem in technical terms.

The next phase is the system design. Design is the creative process of transforming the problem into a solution. The description of solution is also called design. Once the requirements are defined, a system design will be created to meet the requirements. The system design will describe the whole system features, functions and interactions.

Program design is the third phase in the methodology. The overall system design is used to generate the designs of the individual programs involved. It is designing the system modules or individual program one by one without any integration. The next phase is coding phase. This phase will build up all programs by using selected programming languages and application development tools following the design specification.

The phase after the coding phase is the unit and integration testing. The purpose of unit testing is to ensure that each module behave according to the specification defined during program design phase. It checks each coded module for the presence of bugs. Later, the system will build by adding one piece to the next until the entire system is operational.

The next phase, system testing, involves a test of the whole system to make sure that the functions and interfaces specified initially have been implemented properly. The phase after system testing is the acceptance-testing phase. This phase is to ensure that the system built meet the requirements and the project objectives. The last phase is the operation and maintenance phase. After the system is accepted, it will be delivered and maintenance will be provided if anything goes wrong or if needs and requirements have changed.

The waterfall model with prototyping is chosen because waterfall model can suggest to the developer the sequence of events they should expect to encounter. It can be very useful in helping developers lay out what they need to do and developer also can gauge how close the project is to completion at a given point in time. This model also enables developers to make necessary preparation for the coming phase.

Prototyping is used with waterfall model because it can help the developers to enhance their understanding about the system. Prototype is a partially developed product

that enables customers and developers to examine some aspect of the proposed system and decide if it is suitable or appropriate for the finished product. For example, developers may build a system to implement a small portion of some key requirements to ensure that the requirements are consistent, feasible and practical.

The prototyping approach is based on the premise that users do not know exactly what they want until they actually have a chance to see and work with the system or part of the system. The system developers then build the system using the feedback supplied by the users.

They are two approaches to prototyping: evolutionary and throwaway. A throwaway prototype is software developed to learn more about a problem or explore feasibility or desirability of possible solutions. A throwaway prototype is exploratory, and it is not intended to be used as an actual part of the delivered software. On the other hand, an evolutionary prototype is developed to learn about a problem and form the basis for some or all of the delivered software. Once the requisite knowledge is gained, the prototype is then adapted to satisfy the better understood needs.

The reasons why the prototype methodology is important are show below:

- Requirements are often poorly understood.
- Requirements usually change during the development process.
- Current requirements remain only partially understood until after users have had an actual opportunity to use a system.

For the proposed system prototype, it will be presented to the administrator of human resources department to let them see and work with the system or part of the system. Feedback supplied by them will be used to make correction or modification in order to fulfill user and system requirements.

There are also two important activities as depicted in figure 3.1, i.e. validation and verification. Validation ensures that the system has implemented all of the requirements, so that each system function can be traced back to a particular requirement in the specification. Verification ensures that each function works correctly. That is, validation makes sure that the developer is building the right product (according to the specification) while verification checks the quality of the implementation.

3.3 Rationale for Proposed Methodology

I intend to use the waterfall model with prototyping because of some characteristics and advantages gained by using it. Below are the advantages gained in using this methodology:

- It presents a very high-level view of what is going on during development, and it suggests the sequence of events a developer should expect to encounter.
- It is very useful in helping developers lay out what need to be done.
- Its simplicity makes it easy to explain to others who are not familiar with software development.
- It makes explicitly which intermediate products are necessary in order to begin the next stage of development.
- The sub process, i.e. prototyping, can help to examine some aspects of the proposed system and decide if it is suitable.
- Prototyping helps to reduce cost by discovering the problems of consistency and feasibility of the system and the earlier stage rather at the most costly stages.

3.4 Requirement Analysis

Requirement analysis is a very important phase in ensuring success of a system. This is because the acceptability of the system after it has been developed all depends on how well it meets the users needs, and how well it supports the work to be automated. The system will not meet the expectation if a system analyst does not realize the user requirement for the system. The analysis from literature review, that includes analysis of some available systems, and other studies will help to determine a set of system requirements for the online human resource management system.

The process of determining the requirements for the system begin with the information and system related materials collecting. Figure 3.2 below shows the steps of the requirements analysis.

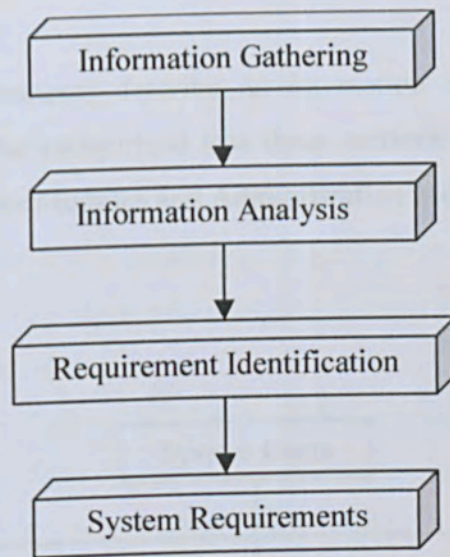


Figure 3.2: Process of Determining System Requirements

- **Information Gathering**
Information collected through research via newspaper, Internet and magazines to get related materials to the system.
- **Information Analysis**
Analyze collected information or materials and identify functions provided by other related systems. Effectiveness and importance of the functions is required.
- **Requirements Identification**
Requirements of the proposed system should be identified by using the knowledge gained from the earlier analysis.
- **System Requirements**
A set of system requirements, which includes functional or non-functional requirements that have been identified, will be used throughout the development of the system.

3.4.1 Functional Requirements

Functional requirements describe an interaction between the system and its environment. It can be categorized into three sections. These sections are Member Modules, Non-Member Modules and Administration Modules.

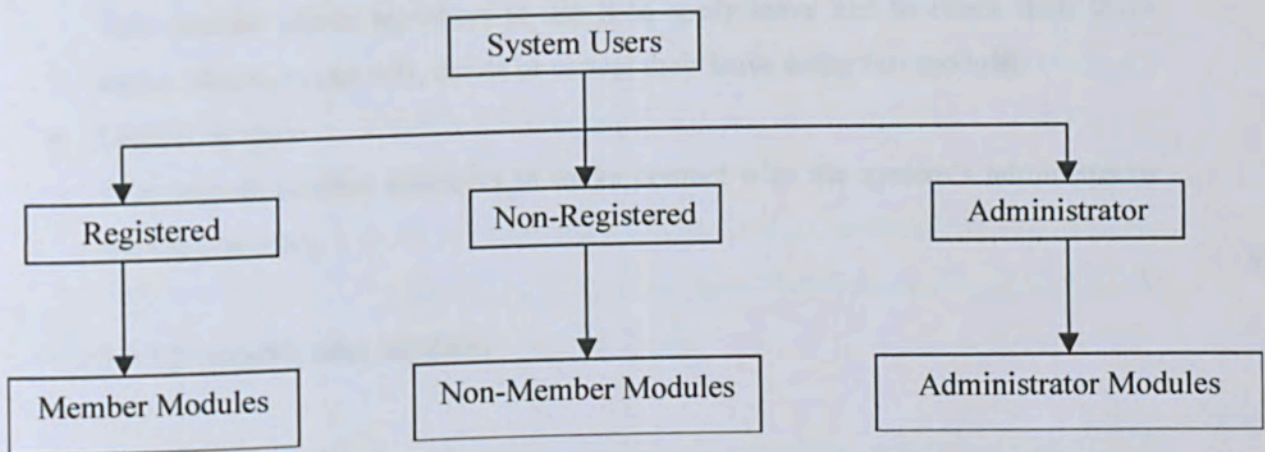


Figure 3.3: Types of System Users

3.4.1.1 Member Modules

- Login Module
Enable member to login to the system with their valid email and password.
- Forgot Password Module
If member forgot their password, they can use this module to get an email, which contain their password after they enter valid email.
- Email Module
This module enables members to send email to the administrator to get further information or make any appointment.

- Administer Workforces Module

This module enables members to access employee personal data, but only to view data without permission to make any changes.

- Position Management Module

This module enables member to access current information about employee status includes their information about department, postposition and others. Members are not having any permission to make any changes in this module.

- Global Absence Module

This module allows members to use it to apply leave and to check their leave status. Members can edit, delete or cancel their leave using this module.

- Contact Module

This module enables members to make contact with the system's administrator and the company.

3.4.1.2 Non-Member Modules

- Registration Module

This module allows non-member user to register as a member of the system, so that they can use all functions provided by the system like any other member.

- Employee Information Module

This module enables non-members to view information

3.4.1.3 Administration Modules

- Administer Workforces Maintenance Module

This module is used by the administrator to customize and monitor the employee's personal information.

- Position Management Maintenance Module

This module is used by the administrator to customize and monitor the employee's status information.

- Add Administrator Module

Administrator can add new administrator of the system by using this module.

- User's Accounts Maintenance Module

This module enables the administrator to view and monitor the user's information.

3.4.2 Non-Functional Requirements

Non-functional requirements are essential definition of system properties and constraint under which the system must operate. Although these requirements are very subjective, they are still very important to ensure the success of the system.

- Reliability

Application system availability is important to ensure that the software and hardware do not cause unnecessary failure or downtime when they are used in a reasonable manner.

- Response Time

The response time should be within a reasonable interval in retrieving any data or information. Good application systems should have shorter response time.

- User Friendly

System should have a user friendly interface so that it is easy to use and understand. Graphical User Interface (GUI) approach should be applied.

- Availability

All the system data and application should be ready in use at all time

- Manageability

The application system, hardware and software should be able to be manage and operated easily.

- Robustness

The system should be able to handle or at least avoid disaster in the face of unexpected circumstances such as input of improper data.

- Security

The system should be able to prevent unauthorized user's access to the system.

3.5 Feasibility Study

After the analysis of requirements, development methodology and other related topics, the feasibility of the online Human Resource Management System in several aspects such as operational, technical, and economical can be determined. The feasibility of the system is important to ensure that the system can be built with available sources and technology to perform how it is supposed to.

- **Operational Feasibility**

The proposed system will be completed within the period of time as expected according to the complete research, analysis and planning. The system can be used after it is developed and pass several testing processes. The system will meet the requirements by allowing users to apply leave via system and search their related information. The system will run under the control of the administrator who will administer all records and add new employee record. Users can gain all of the services provided by the system as long as they meet the hardware and software requirements.

- **Technical Feasibility**

The proposed system is feasible for the technical aspects since no sophisticated or extra powerful technical support is needed to implement the system. Developers who have responsible knowledge in programming, software engineering, networking and business can build system in timely manner.

- **Economical Feasibility**

The development of this system does not require large amount of cost. It can be built as long as the developer has met the minimum hardware and software requirements. Many functions that will be used are free. The benefits gained by the system will be more than the cost of developing the system, since this kind of system is not so common in Malaysia. This can be determined through the concept in the business community, Return On Investment (ROI).

3.6 System Requirement

3.6.1 System developer Requirements

▪ Hardware

Processor	450 Mhz or above
RAM	Minimum 128 Mb
Hard Disk	10 GB or above
Other	Others standard computer peripherals

Table 3.1 : System Developer Hardware Requirements

▪ Software

Web Server	IIS (Internet Information Server)
Database Server and application	Microsoft SQL Server 2000
Database Designing	SQL
Operating System	Microsoft Window 2000 Professional
Server-side Scripting	ASP (Active Server Pages)
Client-side Scripting	JavaScript, VBScript
Web Browser	Internet Explore 4.0 or above Netscape Communicator 4.0 or above
Web Pages Coding	HTML (Hypertext Markup Language)
User Interface Designing	Macromedia Dreamweaver UltraDev 4.0
Documentation and Scheduling	Microsoft Word 2000, Microsoft Visio, Microsoft Project 2000

Table 3.2: System Developer Software Requirements

3.6.2 System User Requirements

▪ Hardware

Processor	450 Mhz or above
RAM	Minimum 128 Mb
Hard Disk	10 GB or above
Other	Reasonable quality dial-up connection line. Others standard computer peripherals

Table 3.3: System User Hardware Requirements

▪ Software

Operating System	Microsoft Windows 98, 2000, ME
Browser	Internet Explore 4.0 or above Netscape Communicator 4.0 or above

Table 3.4: System User Software Requirements

CHAPTER 4

SYSTEM DESIGN

4.1 Introduction

System design or conceptual design describes the system in language that the customer can understand, rather than in computer jargon and technical terms [Shari Lawrence Pfleeger, 2001].

System design is a process to convert the conceptual ideas from requirement specification in system analysis into more technical specification. A design specification displays both the physical and logical design of the system. Physical design is the Human Resources Management System architecture design. For the logical design, specifications are on the system functionality design and prototyped user interface design. The design phase gives us to plan a structure approach to solve the problem specified in the system analysis.

Design is really a two-part iterative process. First, we produce a conceptual design or system design that tells the user exactly what the system will do. Then, we translate the conceptual into much more detailed document, the technical design to understand the actual hardware and software needed.

The process is iterative because, in actuality, the designers move back and forth among activities involving understanding the requirements, proposing possible solutions, testing aspects of solution for feasibility, presenting possibilities and documenting the design for the programmers. Sometimes, the design is described in one document, but often there are two, as illustrated in figure 4.1. Thus, the conceptual design concentrates on the system's function, and the technical design describes the form the system will take.

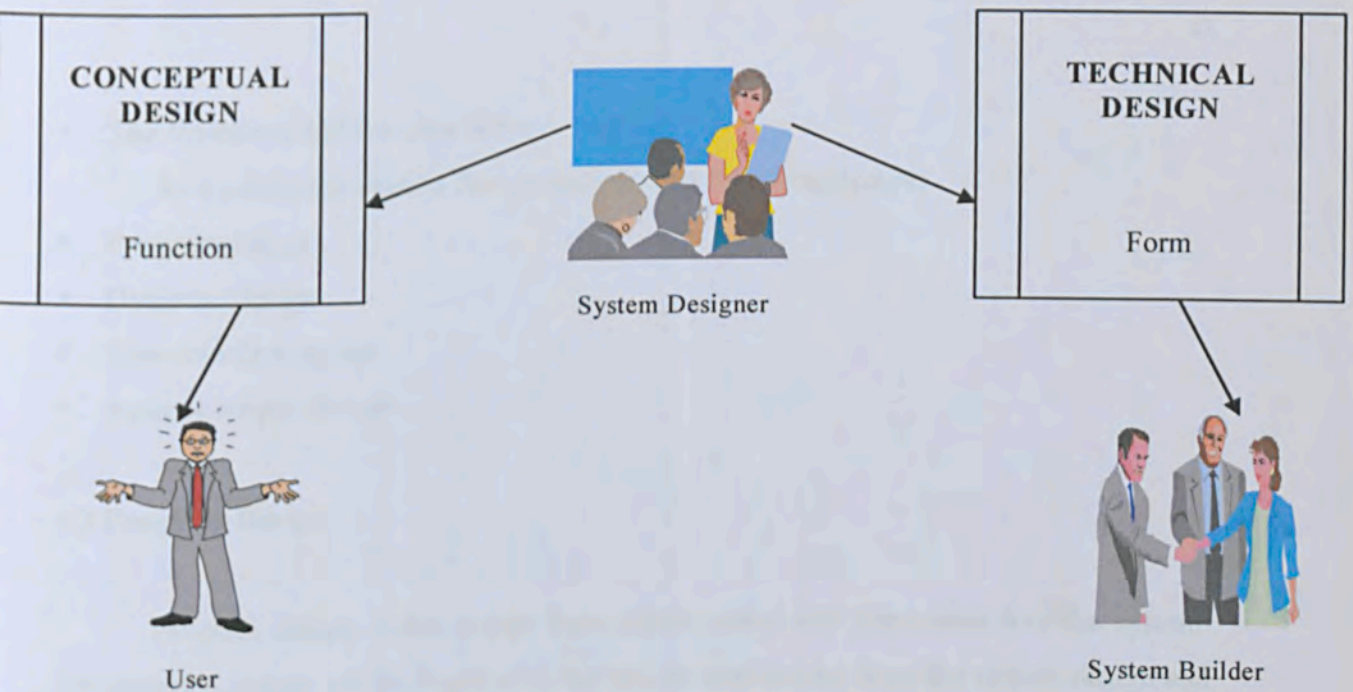


Figure 4.1: Conceptual and Technical Designs

System is defined by its boundary, entities, attributes and relationship. The conceptual design describes each of these system aspects, answering questions such as the following:

- What will data come from?
- What will happen to the data in the system?
- What will the system look like to users?
- What choices will be offered to users?
- What is the timing of events?
- What will the report and screens look like?

By contrast, the technical design describes the hardware configuration, the software needs, the communication interfaces, the input and output of the system, the network architecture, and anything else that translate the requirements into solution to the customer's problem. That is, the technical design description is a technical picture of the system specification. It usually includes at least the following items:

- A description of the major hardware components and their functions.
- The hierarchy and function of the software components.

- The structures and the data flow.

As a result, the system design includes the following issues:

- Program design
- Database design
- User Interface design
- Input or output design

4.2 Program Design

Program design is the design from which codes will implement into the system. The program design efforts begin with the objects and classes from the system design and modify to include more items.

During problem design, we must make more detailed decisions about the data. We must also specify the features of each object's interface. Once we have defined the interfaces, we can classify them by types, and build a hierarchy of interface types where some interface inherit properties from other interfaces. When a particular object is instantiated, the compiler allocates storage for the internal data needed by the object. It then associates operation with data.

4.2.1 Data Flow Diagram

The Data Flow Diagram is a process modeling that represents the functions or processes in a system graphically. It displays the data flow and processes that is involved in a system. The DFD is drawn using four main elements; entity, Process, data flow and data store. The notations that will be used to represent these elements are the Gane and Sarson notation. The following shows the elements with their notations.

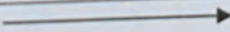
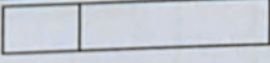
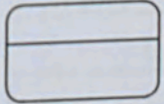
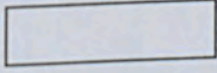
Elements	Notations
Data flow	
Data store	
Process	
Entity	

Table 4.1: Notation symbols in a Data flow Diagram

Firstly, we must determine the Human Resource Management System flow management. The context diagram shows us about the scope and limitation for the information system. It is the highest level of data flow diagram and was the first to draw when we like to prepare the data flow for the environment system.

As stated, we can see the context diagram of HRMS in figure 4.3

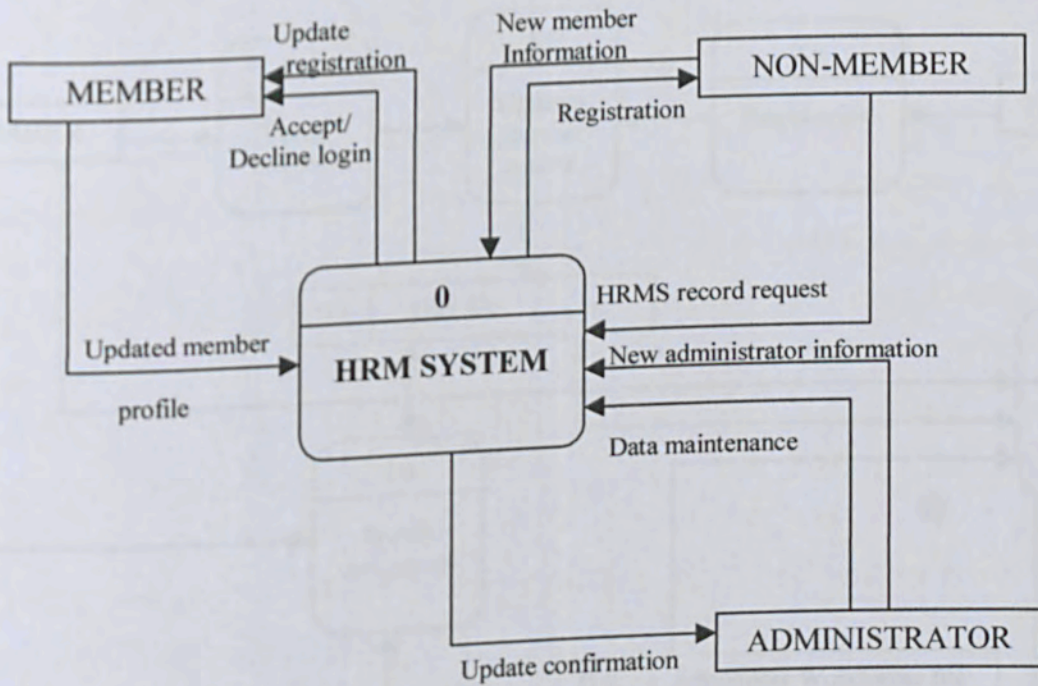


Figure 4.3: The HRMS Context Diagram

While, zero diagram is second level of data flow diagram and it shows us the detail about the context diagram. We can see it through the diagram that stated in figure 4.4.

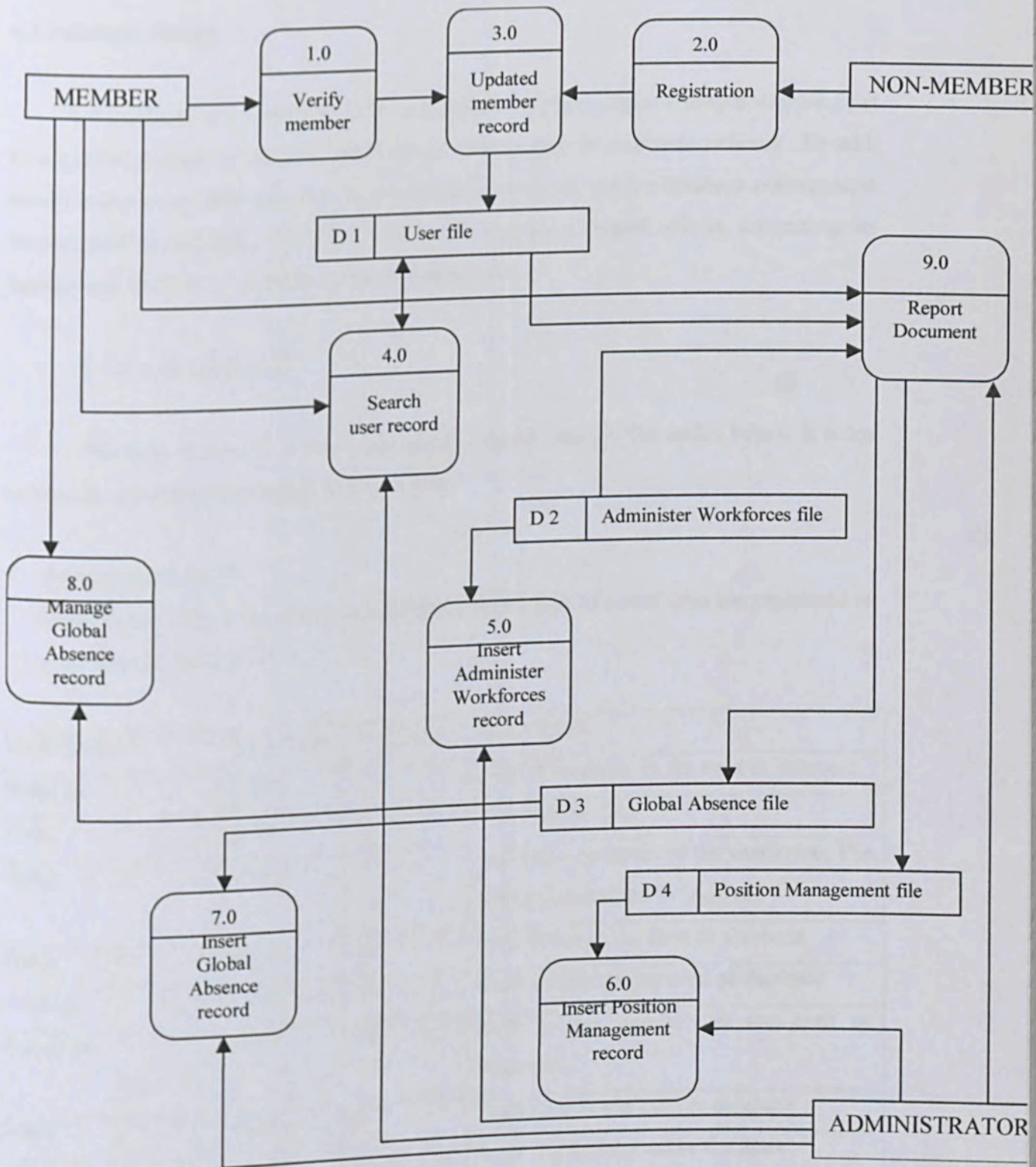


Figure 4.4: The HRMS Zero Diagram

4.3 Database Design

A database is a collection of data. It may be anything from a simple shopping list to a picture gallery or the vast amounts of information in corporate network. To add, access and process data stored in a computer database, we need a database management system such as MySQL. Database management plays a central role in computing, as stand-alone utilities, or as parts of other applications.

4.3.1 Data Dictionary

The fully attributes of entity are identified and listed in the tables below. It helps to identify the definition of data in the system.

▪ TABLE MEMBER

Description: This is the table for storing the particulars of a user who has registered as a member of the system.

Field Name	Data Type	Field Size	Description
Empl ID	Char	7	Staff ID number in the card or database
Date	Date	8	The current data
Status	Char	3	Indicates the status of the employee. The status is defaulted to 'Active'
Name	Char	30	Staff name in the card or database
Address	Char	45	Staff address in the card or database
Phone no	Char	10	Staff phone number in the card or database
State	Char	8	Staff state in the card or database
City	Char	8	Staff city in the card or database
Age	Number	3	Staff age on the current date

Table 4.1 Data Dictionary of Administer Workforces

4.4 User Interface Design

User interface can be tricky things to design, because different people have different styles or perceiving and understanding. For example, one user may use the word processing package by pressing on function keys, whereas another relies mostly on the mouse. Similarly, users differ in the sequence in which they perform actions; in their preferences for commands, dials, and windows; and in the degree to which they use help screens and manuals. The issues involved in interface design are:

- **Metaphors**
The fundamental terms, images and concepts that can be recognized and learned.
- **A mental mode**
The organization and representation of data, functions, tasks and roles.
- **The navigation rules for the model**
How to move among data, functions, activities and roles.
- **Look**
The characteristics of the system's appearance that convey information to the user.
- **Feel**
The interaction techniques that provide an appealing experience for the user.

In order to design comfortable, effective interfaces, we must consider two key issues: cultural and preference.

- **Cultural issues**
To determine interface preferences must take into account both cultural differences and group dynamics for the population of likely users.
- **User preferences**
Some aspect of design depends on user preferences, either alone or as members of a group of workers.

4.5 Input or Output Design

4.5.1 Input Design

The input design is how to specify the best method to input data in the system. Output will not be able to view if no input. To get the best output, it depends on the best input. There are many input devices to consider for insert or input data. For example, keyboard, mouse, touch-screen, and many more.

The method to input data in the system usually use these two methods. The first method is using a screen form and the second, using printed form. A screen form is an input data that view in the computer screen. It is design for the purpose to input data in the system directly using some devices. While, printed form is a conventional method form that already prints on a piece of paper. Then, the information in a printed form will be to put in the system using screen form.

4.5.2 Output Design

Output is the result of the process and is generate from input. Output is a medium to present information to the user. The usual devices for output are printer, monitor screen, plotter and many more. Output can be divided into several types such as output screen, printed output and others.

Output screen can be obtained by using devices based on computer. The computer screen is the mediator of visual display through CRT Terminal or monitor. Output screen provides the facility for user system to access information easily and faster.

Other than output screen, the method that usually uses is printed output or printing paper. In this time, the cost of using paper is still not expensive and also it's last out. Printed output is acquired by using printer like impact printer or laser printer. Usually, the printed output format is internal or external.

CHAPTER 5

SYSTEM IMPLEMENTATION

5.1 Introduction

System implementation is the process that converts the system requirements and design into program codes. For this system, the processes that involve start from the installation and set up of the Web Server and the required software and hardware till the coding of the modules and finally the integration at all modules.

5.2 Development Environment

Development environment has certain impact on the development of the system. Using the suitable hardware and software will help to speed up the system development and determine the success of the project. Therefore, the hardware and software chosen to develop the system are critical.

5.2.1 Hardware Are Used

The hardware used to develop the system is as listed:

- Intel Pentium III 550 Mhz Processor
- 10 GB Hard Disk
- 10 MB RAM
- Other standard Computer components

5.2.2 Software Are Used

5.2.2.1 Tools for System Documentation

For the system documentation, Microsoft Word 2000, Microsoft Visio 2000 and Adobe Photoshop 6.0 are used to draw the structure charts, DFD, flow charts, and to do the report writing and user manual documentation.

5.2.2.2 Tools for System Development

The chosen of the development tools are important in determining the usability of the entire system. Below is the list of the software tools used during the development of the system.

Software/Software Tools	Description
Microsoft Windows 2000 Professional	Operating System
Microsoft SQL Server 2000	Database Server and application
JavaScript, VBScript, HTML	Client-side Scripting
ASP (Active Server Page)	Server-side Scripting
Internet Explorer 4.0 or above	Web Browser
Netscape Communicator 4.0 or above	
Macromedia Dreamweaver UltraDev 4.0	Coding Web Pages
Microsoft Visual Interdev 6.0	
Adobe Photoshop 6.0	Image design and creation

Table 4.1: summary of Software /Software Tools Used

5.3 System Development

The Human Resource Management System is developed using a modular approach where each module is developed separately later into a fully functional system.

For each module, it is further refined into functions and procedures. By using the modular approach, future modifications and enhancements can be made easily.

5.3.1 Web Pages Coding/Scripting

Coding the program is the process of writing the program instruction that implements the program design. If design is performed in detailed manner, then the coding can be accomplished easily. There are two types of scripting, which are client-side scripting, that must be delimited by the `<SCRIPT>....</SCRIPT>` tags. On the other hand, server-side scripting is using the script delimiters `<%` and `%>`. Any text enclosed within these delimiters will be processed as a script.

5.3.1.1 Coding Approach

The Human Resource Management System is coded using the top-down hierarchical approach and modular programming approach.

The top-down hierarchical approach is an approach that is suitable to be implementing of well-structured program. This approach is adopted due to the depending of the login function before the member of the system can use most of the function. First, the home page is created and then the others modules are created and subsequently sub-modules are created.

The modular approach is a method, which is each single module, is developed separately with distinct functions. When each module is complete, then the related modules are integrated into a fully functional system with suitable interfaces.

5.3.1.2 Coding Style

Coding style is an important attribute of source code and it determines the intelligibility of a program. An easy to read source code makes the system easier to maintain and enhance. The element of coding style includes internal (source code level)

documentation, method for data declaration, code identification and the sequence of the codes.

- Internal Documentation

The comments written in the code can help the user of the program to understand the code easily. This can provide a clear guide during the maintenance or enhancement of the system.

- Method for Data Declaration

A standard and meaningful data declaration method can help programmer to understand the code easily.

- Code Identification

The identification can make the code more clearly and structured.

- Sequence of the code

Standard or familiar methods of the sequence of code writing, for instance, start with ASP code with the connection to database and variable declaration, follow by the JavaScript and finally the HTML. Standardization makes the code easier to understand.

5.3.1.3 Server-side Scripting

As mention above, ASP, which is used to develop the Human Resource Management System is a server-side script and located within the delimiter `<%....%>`. It is invisible to the client and is executed in the server. Hence, ASP is suitable to be employed in the Human Resource Management System and produce consistent result regardless at the browser used. Some of the ASP objects used in the development at this system are:

- Request Object
- Response Object
- Session Object

5.3.1.4 Client-side Scripting

JavaScript and HTML are also used to develop the Human Resources Management System. Both are client-side scripting. JavaScript is located within the delimiters, `< script language="JavaScript">` and `</script>`. It is usually used to do the form validation such as date validation, to ensure the type of the input data is correct and may others useful functions.

5.3.2 Database Development and Connection

The database for Human Resource Management System is created using Microsoft SQL Server 2000. After the SQL server has successfully installed, the SQL Server Enterprise Manager is used to create tables. Creating and modifying tables can be made easily.

Active data Object (ADO) is used to store and retrieve data from a database. Before ADO can be used, a connection string has to be specified. The string contains the driver name, server name, user id, user password and database name. All these information have to be specified in order to make a connection to the database.

All communication with the database takes place through an open connection. Before any information can be inserted into or retrieved from the database, a connection with the database must be opened.

5.3.3 Interface Development

To create images, Adobe Photoshop 6.0n was used. Beside that, Macromedia Dreamweaver UltraDev also helps in web page layout design.

CHAPTER 6

SYSTEM TESTING

6.1 Introduction

Once the program component had been coded, it is time to test it. This chapter will show some essential testing such as Unit Testing, Integration Testing, System Testing and Fundamental Testing. The system maintenance will also be presented too. The purpose to test this system are

- 1) To compared the expected outcome with the actual and debug it to enhance the functionality, performance, reliability and capability
- 2) To test and enhance the main function in Human Resource Managing System add, edit and delete the Administer Workforce, Position Management and Global Absence module.
- 3) Executing a program with the intention of finding error that makes the program fail.
- 4) Test a program to demonstrate the existence of a fault.

Fault identification is the process of determining what fault or fault caused and failure, and fault correction or removal is and process of making changes to the system. So, the faults are removed.

6.2 Testing Strategies

A testing strategy is general approach to the testing process rather than a method of devising particular system or unit test.

The testing strategies include

- 1) Top-down Testing
Testing start with the most abstract component and work downward
- 2) Bottom-up Testing
Testing start with the fundamental components and works upwards

3) Thread Testing

Is used for system with the multiple processes where the processing of transaction thread its way through these process

4) Stress Testing

Relies on stressing the system by doing beyond its specified limits and hence testing how well the system can cope with overload situations

5) Back to Back Testing

Is used when version of a system are available. The systems are tested together and their outputs are compared.

6.3 Testing Steps

Testing steps for The Human Resource Management System consist of three steps as shown in figure below

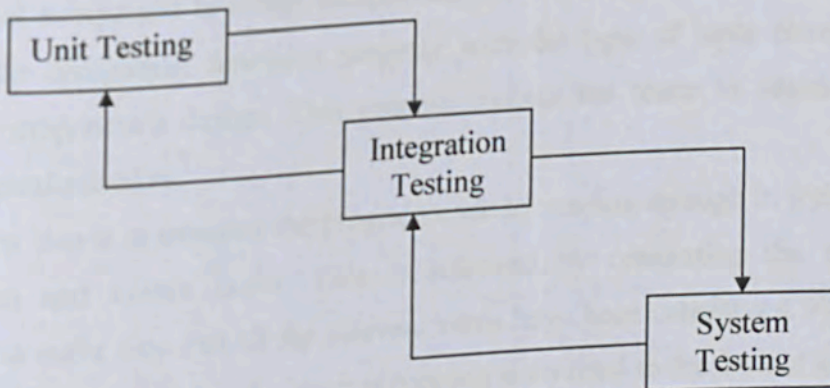


Figure 6.1 Testing Steps

The sequences of the testing activities are unit testing, integration testing system testing. Basically, the system testing is consists of function test, performance test, acceptance test and installation test. In the unit and integration testing, components are tested and then merged into a layer, working system. But in the system testing, the system is viewed and tested as a whole rather than as separate process.

As defects are discovered at any stage, program modifications are required to correct and this may require other stages in the testing process to be repeated. The process with information being get back from later stages to earlier parts of the process.

6.4 Human Resource Management System Testing

For each module in Human Resource Management System, those have been tested separately and were later integrated together. After the integration, the system as a whole is test again. Each module contains function that can be checked and tested carefully. Those functions may call other sub functions and tests are carried out to ensure all possible paths are best.

6.4.1 Unit Testing

Unit testing is concentrate on the smallest component of the system for testing. Each individual component is tested independently without any system components. It verifies that the component functions properly with the type of input expected from studying the component's design. This process enables the tester to detect errors in coding and logical mistakes.

The first step is to examine the program code by reading through it, trying to spot algorithm, data and syntax faults. This is followed by comparing the code with specifications to make sure that all the relevant cases have been considered. Finally, test cases are developed to show that the input is properly converted to the desired input.

For Human Resource Management System, unit testing done concurrently with the development phases. For example, Administer Workforce module has a sub-module, which is to add new employee by administrator of the system. This sub-module is further divided to many functions such as build query by department and total manpower reviewed update fields in database table. Each of these functions are reviewed and checked separately. Then, the sub-module are tested to ensure it functions are desired. After all the sub-modules have been tested, the module will be inspected and tested as a whole.

6.4.2 Integration testing

When the individual components are working correctly with the objectives and requirement, these components are combined into a working system. In other words, integration system is the process of verifying that the system components works together as described in the system and the program design specifications. Testing the interface of two components explores how two components interact with each other.

For Human Resource Management System, a bottom up approach has been used. Each component at the lowest level of the system hierarchy is tested individually first. Then, the next components to be tested are those that call the previously tested ones. This approach is followed repeatedly until all modules includes in the testing.

This bottom up method is useful and suitable for Human Resource Management System since the system is integrating quite a number of stand-alone reused components. Since the system is developed modularly, errors found should be corrected in each module easily.

6.4.3 System Testing

The last testing step is the system testing. Testing the system is very different from unit and integration testing. The objective of system is to ensure that the system did what the customer wants it to do.

These are several steps in testing a system

1) Function Testing

Check the integrated system performs its functions as specified in the requirements. For example, a function test of car advertising verifies that the function can correctly store the information of a car, check the existence of the specific folder, create the folder and store the images.

2) Perform Testing

Compared the integrated components with the non-functional system requirements. These requirements, including accuracy, speed, reliability, and security, constrain the way in which the system functions are performed.

3) Acceptance Testing

Assures the customers that the system that they requested is the system that was built for them. The customers will test the system and make sure that the system will fulfill their demands.

4) Installation Testing

Allows the user to exercise system functions and document additional problems that result from being at the actual site

6.5 Analysis of a Testing

From the testing process that has been carried out, the best result are summarized as below

6.5.1 Achieve the main objective of the project.

Generally, the main objective of the project as described earlier has been achieved. The system is able to add, update, and delete records in database, can upload images, send e-mail, search cars, view cars by category and etc. The administration module is able to manage all the rewards of member, category and administrator.

6.5.2 Attractive and Use Friendly Interface

The use of interface can be more attractive in order to attract the user. Bright color and more attractive icon should be used.

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6.4 System Testing Checklist

6.5.3 Completeness of the information

Since the objective of this system is to eliminate problems such as traveling cost, a car info provided must be clear and enough. Adding more features to describe the car is good way to enhance the system.

Admin	Input data into database	if data is valid then stored in other table	This module is considered
Admin	show previous messages	database and messages	correct and clear
Admin	error if data not valid	display to screen	
User login	Check the username and password, if match with database record, and then redirect to the login page	if success to login, then redirect to the main page. If a record is match, an message is shown	This module is considered
Employee	Search for employee record according to the criteria from the search form	Called and get data from database and show in the screen	This module is considered
Employee	Check data validation	if data not valid then	This module is considered
Application	Updated information will be inserted into the database and show accurate message	information is update into database and message message is shown if data is not valid, then message will appear	This module is considered

Table 6.4: Testing Checklist

6.6 System Testing Checklist

Module/Sub-module	Expected Result	Actual Result	Remarks
User register	Check data validation. Insert data into database show success message error if data not valid	If data is valid, then record is added into database and success message is shown	This module is considered correct and done
User login	Check the username and password, if match with database record, and then redirect to the main page. If no record is match, then show error message.	If record is match, then redirect to the main page. If no record is match, error message is shown.	This module is considered correct and done
Employee Search	Search for employee record according to the criteria from the search form	Current record are get from database and shown in the correct format	This module is considered correct and done
Leave Application	Check data validation. Updated information will be inserted into the database and show success message	If data are valid then information is updated into database and success message is shown. If data are not valid, error message will appear.	This module is considered correct and done

Table 6.1: Testing Checklist

CHAPTER 7

SYSTEM EVALUATION

7.1 Introduction

During the development process, many problems were encountered and solutions were sought to solve those problem. Besides, the system strength and limitation are evaluated from time to time. Hence, the future enhancement of the system can be identified.

7.2 Problem Encountered and the Solution

Research and studies in field such as Internet, File System Object (FSO), SQL and programming concepts are important to build a web-based system. The following are come from a major systems encountered from the beginning to the completion of the system development

7.2.1 Difficulties in Choosing a Development Technology and Programming Language

There are many software tools available to develop a web-based database system currently. Choosing a suitable technology and tools was a critical process as all tools have their strength and weaknesses. In addition, the availability of the required tools development was also a major consideration. A tough decision is needed to choose from Active Server Page (ASP), ASP.Net or Java Server Page (JSP).

Besides, decision is also needed to choose a suitable Operating System, web-server and database server. Choice of Operating System are Windows 98 and Windows 2000. Personal Web Server (PWS) and Internet Info Server (IIS) are choices for Web of Microsoft SQL Server 2000. All those tool are interrelated and so that the decision must be made carefully.

In order to solve all those problems, seeking advises and views from course mate, friends and even senior who had experience in similar project were carried out. As a result, Windows 2000, IIS, Microsoft SQL Server 2000 and ASP have been chosen to be used to develop the Human Resource Management System.

7.2.2 Determining scope of the system

It is difficult to build a full scale and complete system within the given time frame. Inexperience with the current Human Resource Management System in the real world was another obstacle to implement true workable system.

Many researchers, studies and discussion with the project supervisor were held to online the scope of the project to be built during the initial stages.

7.2.3 Inexperience in the Chosen Programming Language

Since there was no prior knowledge of programming in ASP, Java and HTML, there was an uncertainty on how to organize the codes in web pages. These programming languages and concepts were never taught before and it is totally different from what have been taught in lab exercises of the programming. The course that have been taken implement such on application requires a fair grasp of the languages

Although I used many efforts to learn the new technology, choosing to program in ASP is a wise decision. The learning course was short, functions stated in the requirement can be implement to the problems faced were manageable by doing research on related materials and through discussion with course mate using same technology. Trial and error method is also very useful during coding phase.

7.3 System Strengths

There are some strength in the Human Resource Management System. Below are the strengths:

1) Easy Accessibility

The Human Resource Management System is a web-based application and so it can be accessed easily using the web browser. The web browser needed especially Internet Explorer 4.0 could be downloaded free from Microsoft's Website.

2) Effective Error Handling

Inputs by the users are validated before the data are insert to the database. This is used to filter out erroneous data such as invalid data type and to ensure the data consistency or integrity for the system. For example, the date will be checked to make sure it is a valid date.

3) Error Messaging

In HRMS, the error message will be displayed whenever the system found that the data key-in by users is not correct. This enables users to identify and correct the errors effectively. Beside, some error messages are shown in red color that can attract the user's attention easily.

4) Custom Password System

Creating a custom password authentication system prevents unauthorized users from viewing pages that they do not have permission to access. More importantly, unauthorized users are prohibited from changing the data stored in the database.

5) Search Capability

The system provides search capability that allows users to search for a particular type of employees with specified criteria. This will save user's time without the need to browse through all the information in the system.

6) Able to Provide Database Maintenance

Administrators are able to do the maintenance of the records in the database, such as add, update, delete and view all the records.

7) Relatively Fast Response Time for Document Retrieval

The web pages are designed in such a manner that they are loaded in a reasonable amount of time to ensure that the users need not to wait too long to view the pages.

7.4 System Limitations

There are some limitations in the HRMS due to the time constraint, facilities constraint and others undesirable reason.

Below are the limitations:

1) Lack of security Features

No encryption of administrators and member's password in the database. A systematic encryption algorithm should be used to implement in the system.

2) Lack of Online Help

No online help facility is provided. Users can only send email to the administrator of the system if they have any problems or uncertainties about the system.

7.5 Future Enhancement

Some of the future enhancements that can be considered to be included in the HRMS are:

1). Send Email Automatically

The system will send an email to the members automatically after the administrator approves their leave application.

2) Enhance Security of the System

Enable administrators and members' password encryption.

3) Provide Additional Services

Provide additional online services such as company loan guides and information about the loan.

7.6 Summary

The system had been evaluated after the testing phase. The criteria that have been taken into consideration for the evaluation process are problems encountered, system strengths, limitation and future enhancement. This enable the developer to know the weaknesses and strengths of the system and new features that needs to be added in order to make the system more useful and suitable.

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CHAPTER 1: INTRODUCTION

1.1 Welcome

This document is the User Manual for Human Resources Management System. It is a web- based application, which is developed with the objectives of utilizing the computer and information technology to provide an easy, and convenient online Human Resources Management System.

It consists of two sections, namely the user section and the administrator section. User section can be divided into two parts namely the member and the non-member section.

Online Human Resources Management System is easy to use, all the function in this system is meaningfully descriptive and can easily be executed by a simple point and click on the available function button and hypertext link

1.2 About This Manual

This user manual will guide you through all the function available in the system. This manual includes the following parts:

- User section guides
 - Non-member section guides
 - Member section guides
- Administrator section guides

CHAPTER 2: HARDWARE AND SOFTWARE REQUIREMENTS

2.1 Hardware Requirements

Server:

Minimum Intel Pentium 450 MHz

Minimum 128 Mb RAM

Hard Disk 110 GB or above

Keyboard and Mouse as input devices

Workstation:

Standard PC included modem which support online

2.2 Software Requirement

Server

Microsoft Windows 2000 Professional

IIS (internet Information Server)

Microsoft SQL Server 2000

Workstation:

Microsoft Windows 98, 2000, ME

Internet Explorer 4.0 or above or Netscape Communicator 4.5 or above

CHAPTER 3: USER SECTION

The following section will describe all the functions in the user section of Human Resource Management System. This user section can be divided into two parts:

- Non-Member section
- Member section

3.1 Non-Member Section

The non-member section has only one module, which are Registration module. This Registration module has its functions or procedure that play their own part respectively.

3.1.1 Registration Module

The registration module will allow non-member to fill in a form and register to be a member of the system. To enter to the register page, users need to click the Login/Register button in the home page.

3.1.1.1 Home Page

The home page is the first page that all the users will come in to. In this page, the actions that the non-member can take are:

- Click the register button to go to the register page
- Click on the advertisement picture to view the information about current advertisement.

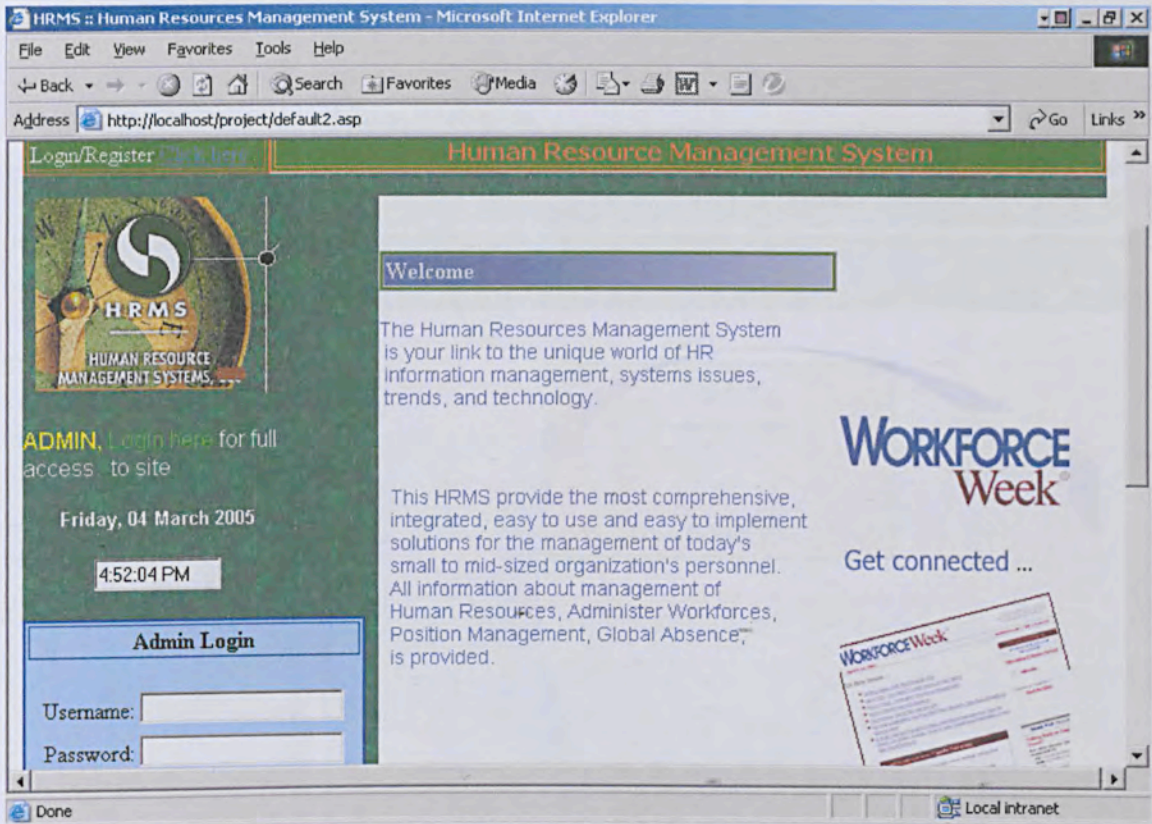


Figure 3.1: Home Page

3.1.1.2 Register Page

Here is where the non-member can register to be a member so that they can use all the facilities provided by the system. Non-member can key-in their details and there will be a data validation checking function where an error message will appear immediately if the data key-in by the user is not valid after user click the submit button. If the registration process is successful, it will redirect to the login page.

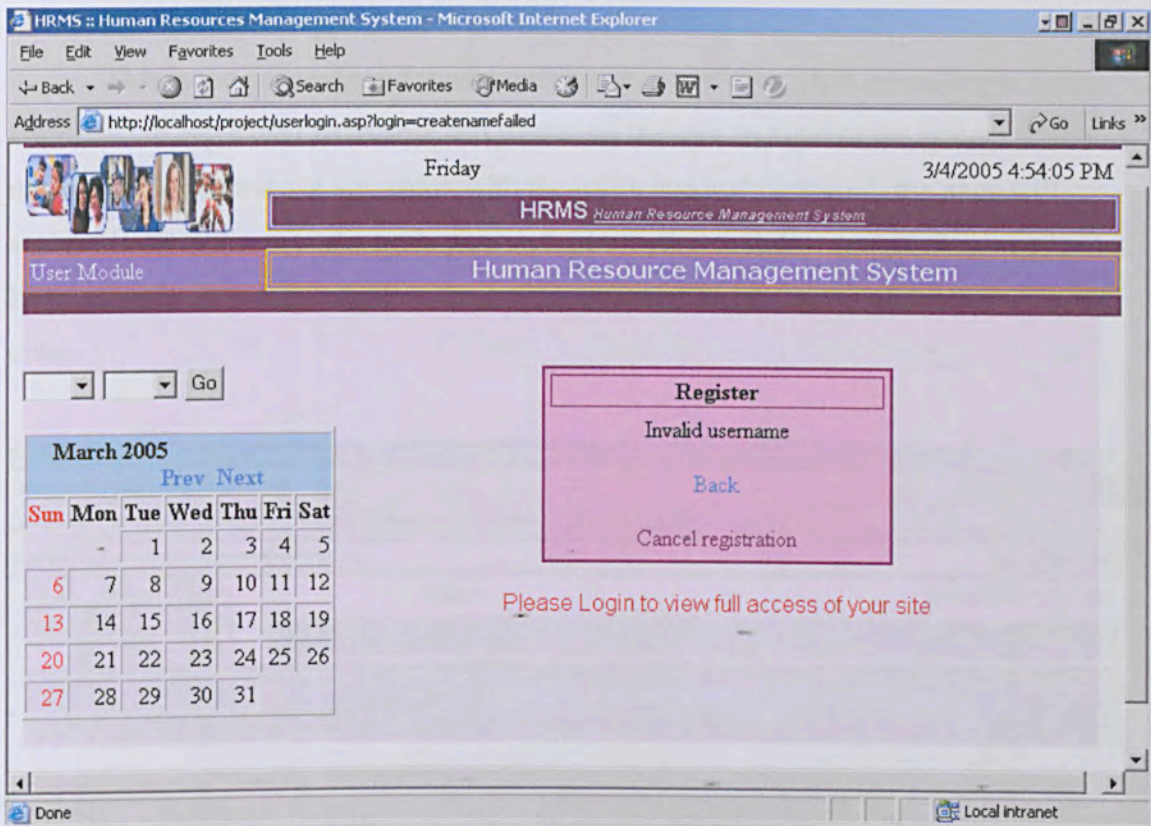


Figure 3.2: Login Error Message

3.2 Member Section

The member section has four modules, which are Login Module, Administer Workforces Module, Global Absence Module and Position Management Module.

3.2.1 Login Module

This module is used to ensure that only authorized users will be able to get into the system. The authorized users will use their valid password to login.

3.2.1.1 Login Page

This is the page where the user will come in to if they click on the login button. User need to enter their username and password in order to login to the system. If the record get from database are match with the username and password, the page will automatically redirect to the main page, where all others module provided can be access. If the records are not match, then the error message , " Login Fail" will be shown in red color.

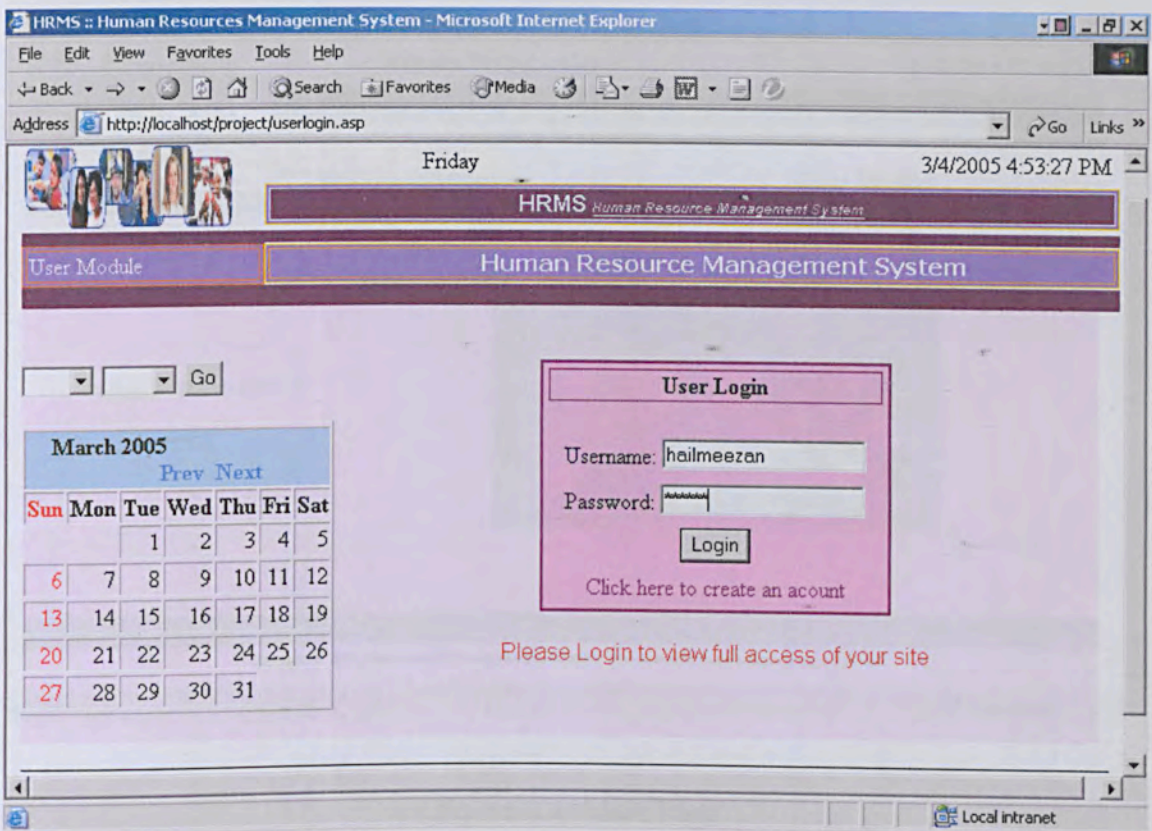


Figure 3.3: Login Page For User

3.2.1.2 Main Page

Figure 3.4 shows the main page that the member will come to after their login process is success. At the top of the page, there is a button that the system provides for the member. Click on any of those buttons will redirect member to another page for the particular function.

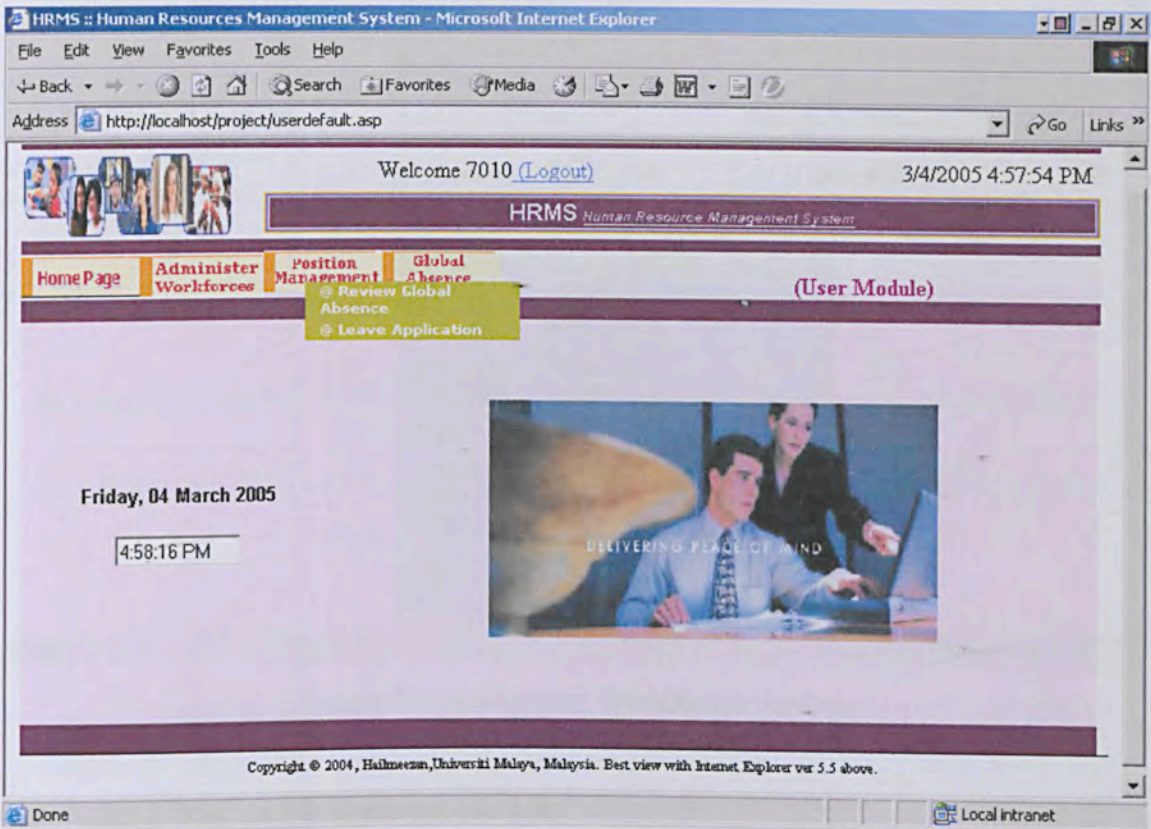


Figure 3.4: Main Page

3.2.2 Administer Workforces Module

This module enables members to view their personal information by click on the button Administer Workforces request and review.

3.2.2.1 Administer Workforces Request and Review page

This is the page where the user will come in to if they click on the button. All the information of their personal information are shown.

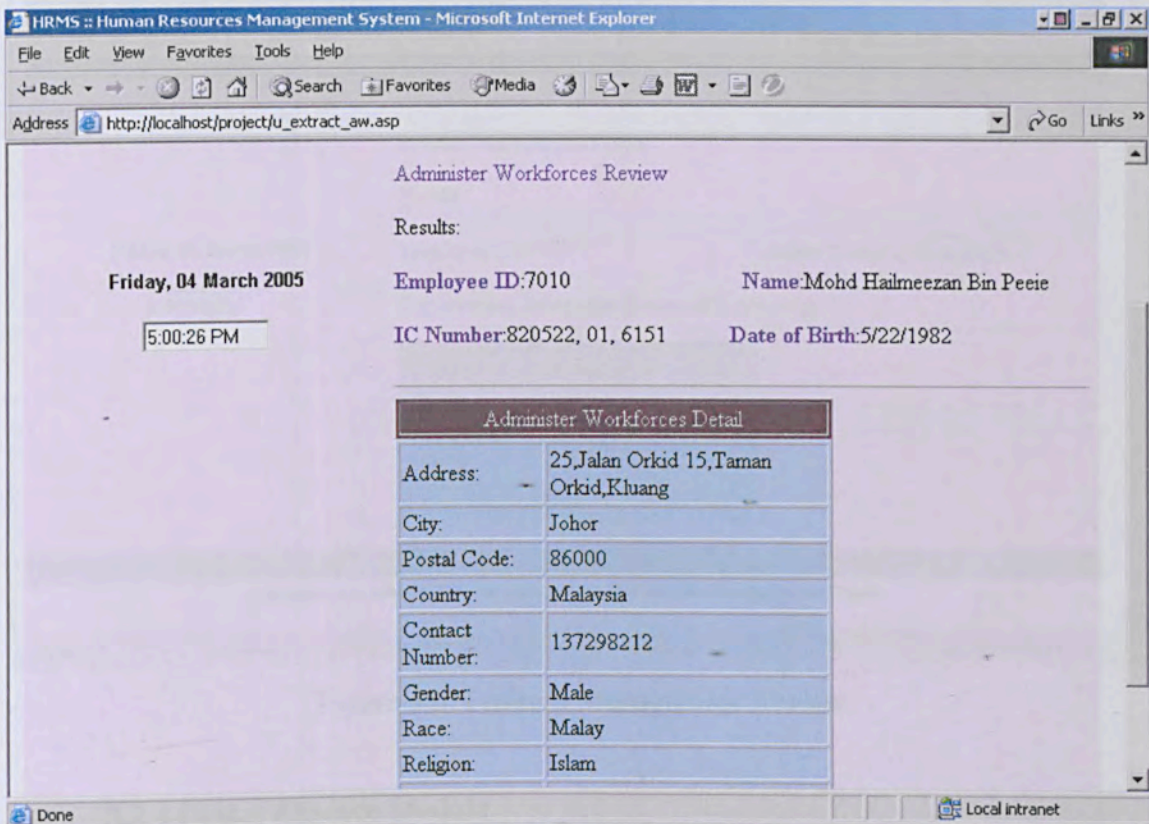


Figure 3.5: Administer Workforces Review

3.2.3 Position Management Module

This module enables members to view their current information about employee status in the company such as their department, rank position and others by click on the button Position Management Request and Review.

3.2.3.1 Position Management Request and Review

This is the page where the user will come in to if they click on the button. All the information of their current information are shown..

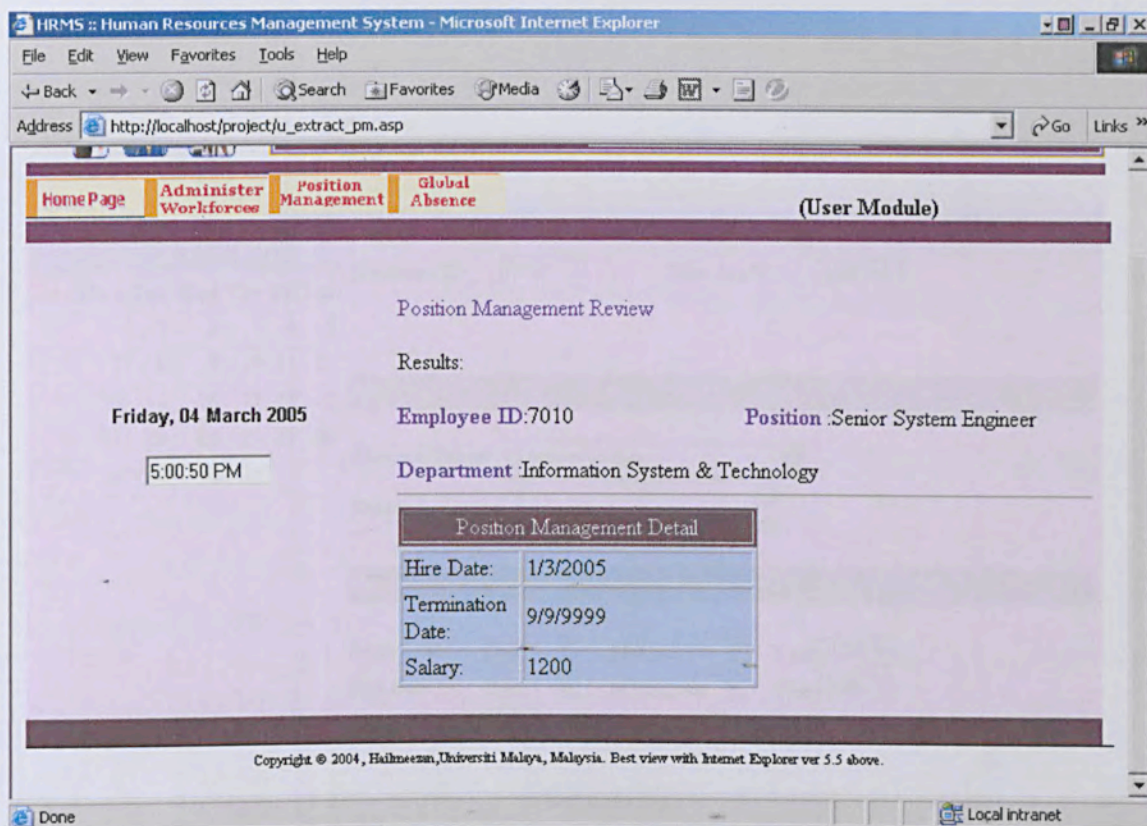


Figure 3.6: Position Management Review

3.2.4 Global Absence Module

This enables member to view their information by click in the button Global Absence Request and Review and also member can use this module to apply leave via online by clicking on the button Leave Application.

HRMS :: Human Resources Management System - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Forward Stop Search Favorites Media Print W

Address http://localhost/project/u_form_add_ga.asp Go Links

Go Leave Apply

March 2005						
Prev Next						
Sun	Mon	Tue	Wed	Thu	Fri	Sat
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

Employee ID: 7010 Date Apply: 3/4/2005

Absence Detail

Absence Taken: Annual Leave

Reason:

Absence Duration

Begin Date: Day: 1 Month: Jan Year: 2005

End Date: Day: 1 Month: Jan Year: 2005

Duration: 1 Days

Done Local intranet

Figure 3.7: Application Form

The application page will provide a form where member can use it to enter all the information about their absence details. There are drop down list boxes, and text fields provided to make the process easier. Error message will appear if the data key-in by the user is not valid. If the process is successful, success message will appear

CHAPTER 4: ADMINISTARTOR MODULE

The following section will describe all the function in the administrator section of Human Resources Management System. In order to get into the administrator section, the administrator needs to do login by using their username and password. If the username and password are correct, it will redirect to the Administration Main Page, otherwise an error message will shown in the login page.

Basically there are five modules in the administration section, which are the Administer Workforces Module, Position management Module, Global Absence Module, User Account Maintenance Module and reporting Tools module. These entire modules are provided so that the administrators can manage and maintain all the records stored in the database.

4.1 Administration Main Page

This is the first page where the administrators will reach after they login successfully. There is a menu bar in every page, which is enables administrator to swift to other page easily.

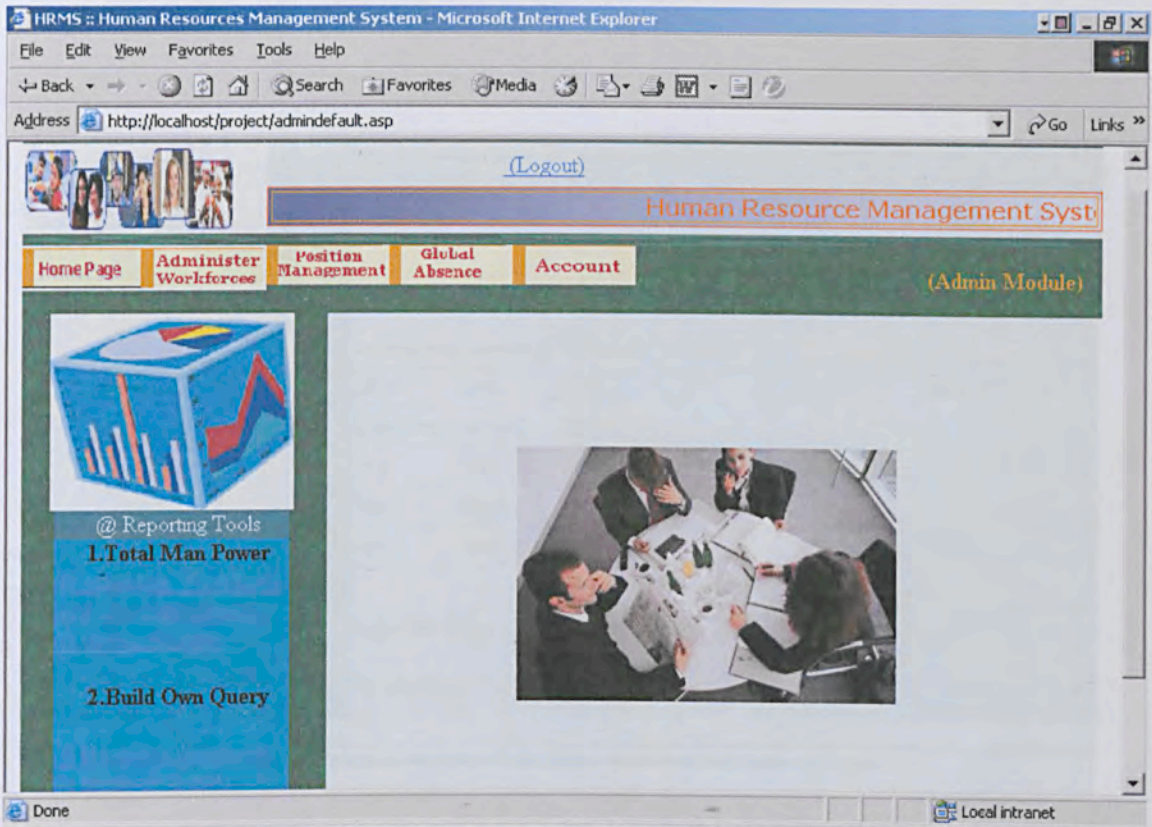


Figure 4.1: Administrator Home Page

4.2 User Accounts Maintenance Module

This module enables the administrator to manage the record of all members. Administrator can view the details of all the members in a list or can delete the record of the members in the database.

4.2.1 Member Listing Page

This page will list down the records of all the members of the system according to the Staff No. Administrator can view the details or delete by click on the Member ID of the selected record. To delete members' records, administrators have to tick in the checkbox and then click the "Delete" button. A confirm message will prompt out before the records are deleted.

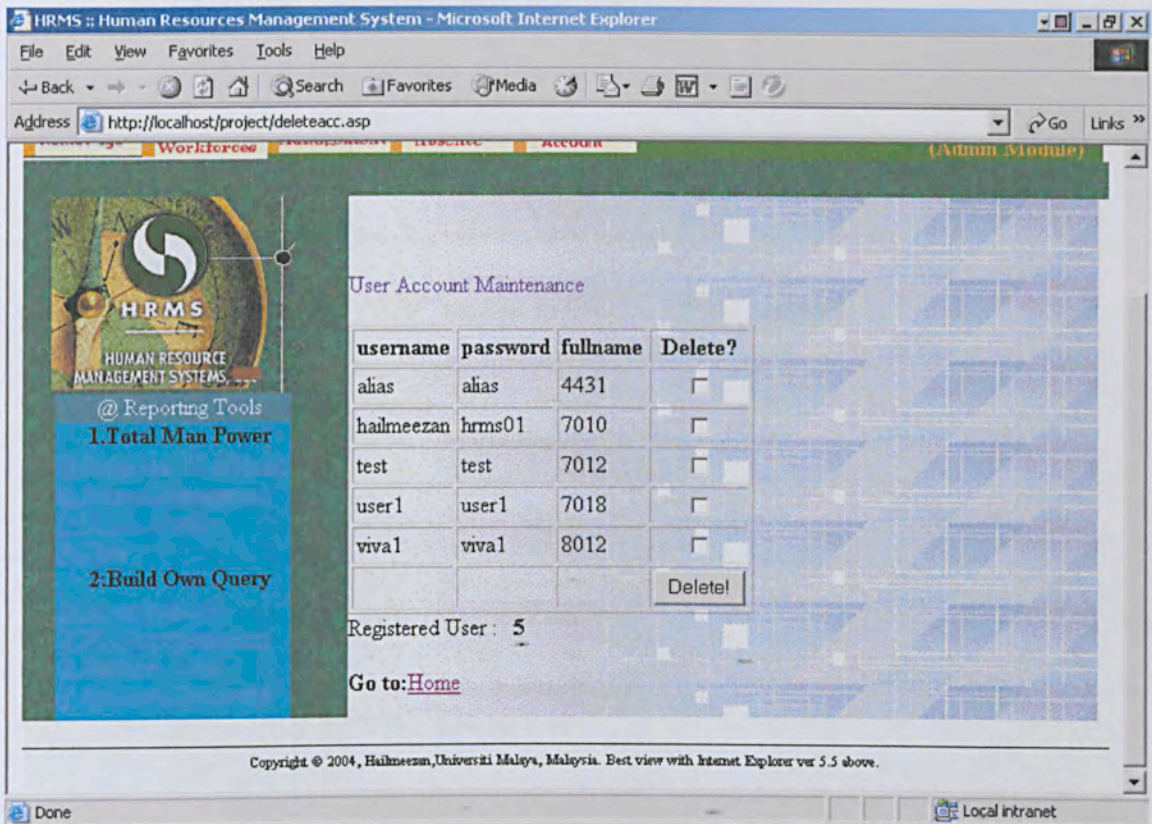


Figure 4.2: Member Listing Page

4.3 Administrator Detail Page

There are four actions that can be taken by the administrators when they get into the Administration Main Page. Those actions are:

4.3.1 Request and Review

If the administrator click the "Request and Review" button in every module page, then the searching page will shown. Administrator needs to enter Employee ID number to review the specified information.

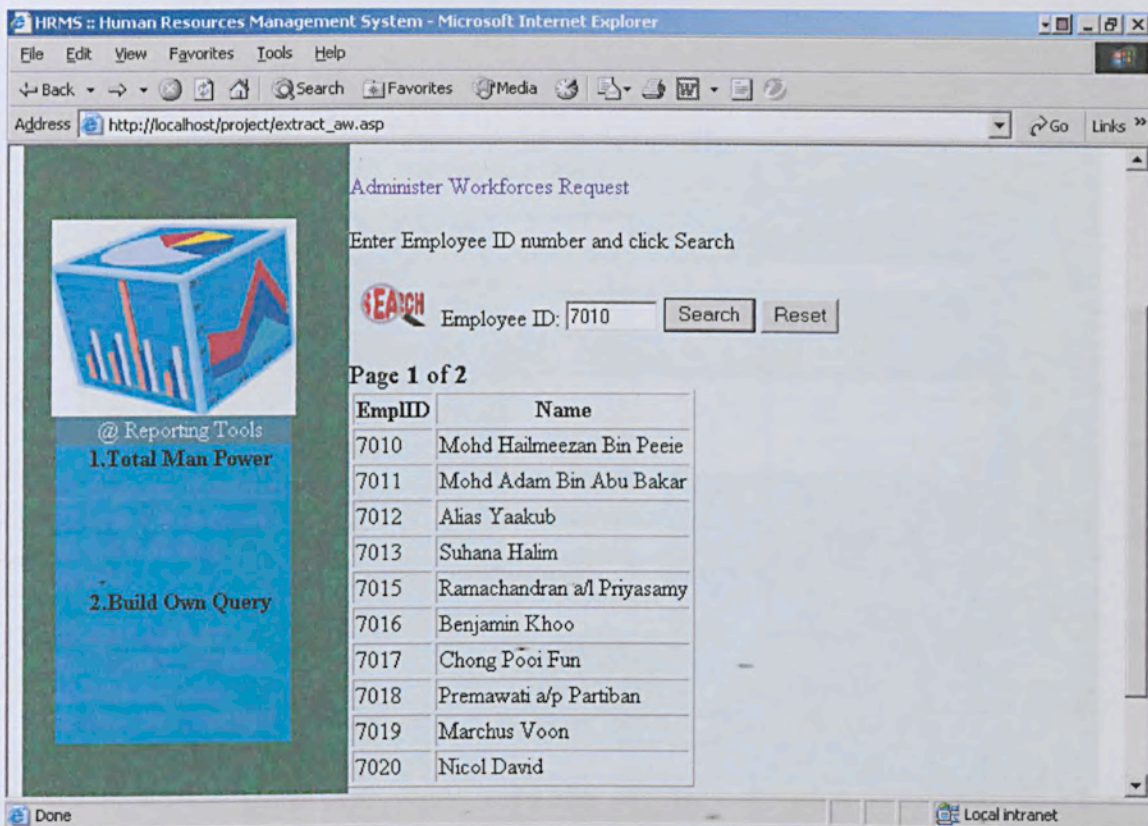


Figure 4.3: Request Page

4.3.2 Add New

If the administrator click the "Add New" button in every module page, then the form for add new record will be shown. If the administrator click the Add button and the record is successfully added into the database, it will redirect back to the Administrator Detail Page.

HRMS :: Human Resources Management System - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Forward Stop Home Search Favorites Media

Address http://localhost/project/form_add_aw.asp Go Links

Add New Administer Workforces

Employee ID:

Name:

IC Number: - -

Date of Birth: Day: Month: Year:

Address:

City:

Postal Code:

Country:

Phone Number:

Gender: ☐ Male ☐ Female

Race: ☐ Malay ☐ Chinese ☐ Indian ☐ Others

Religion: ☐ Islam ☐ Buddha ☐ Hindu ☐ Kristian ☐ Others

Nationality:

@ Reporting Tools

1.Total Man Power

2.Build Own Query

Done Local intranet

Figure 4.4: Add New Page

4.3.3 Update record

All the details of the selected members are shown in a form if the administrator clicks on the Employee ID number in the Update pages. The "Update" button will appear and the administrator can updates the details by click on it. If the record successfully updated, then it will redirect back to Update page with the message "Record Updated"

4.3.4 Delete record

Administrator can delete the selected record by enter Employee ID number. If the record is successfully deleted, it will redirect back to the search page with the message "Record Deleted".

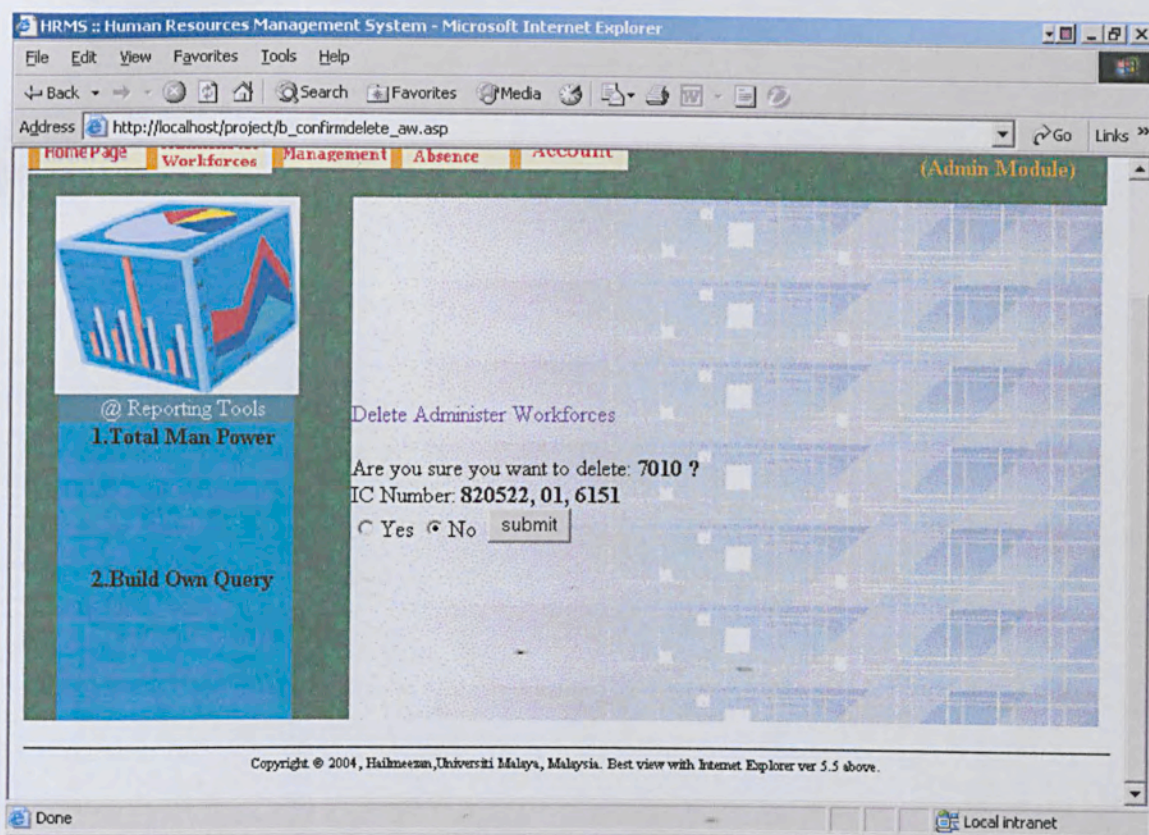


Figure 4.5: Delete Page